

UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NORTH CAROLINA
ASHEVILLE DIVISION

STATE OF NORTH CAROLINA, ex)	
rel. Roy Cooper,)	
Attorney General,)	
)	
Plaintiff,)	No. 1:06-CV-20
)	
vs.)	VOLUME 5B
)	PAGES 1170-1284
TENNESSEE VALLEY AUTHORITY,)	
)	
Defendant.)	
_____)	

TRANSCRIPT OF TRIAL PROCEEDINGS
BEFORE THE HONORABLE LACY H. THORNBURG
UNITED STATES DISTRICT COURT JUDGE
JULY 18th, 2008

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1 E X H I B I T S

2 PLAINTIFF'S WITNESSES:

3 LELAND B. DECK:

4 Cont'd Direct Examination by Mr. Goodstein 1172, 1228
 Cross-Examination by Mr. Lancaster 1213

5 MORGAN SOMMERVILLE:

6 Direct Examination by Mr. Gulick 1232

7 LEAH MATHEWS:

8 Direct Examination by Mr. Gulick 1253, 1283
 Cross-Examination by Ms. Gillen 1277

9 * * * * *

10 PLAINTIFF'S EXHIBITS:

<u>NO.</u>	<u>DESCRIPTION</u>	<u>MARKED</u>	<u>RECEIVED</u>
11 275	User survey	1246	1252
12 276	Appalachian Trial Vital Signs Rpt	1236	1252
13 280	Blue Ridge Survey	1274	1277
14 281	Blue Ridge Survey	1263	1277
15 383	Unit values	1172	1190
16 384	Result tables	1178	1190
17 385	Result tables	1180	1190
18 386	Result tables	1181	1190
19 387	Result tables	1182	1190
20 388	Quantified/Unquantified effects	1185	1190
21 389	Quantified health benefits	1186	1190
22 390	Cost-benefit analysis	1192	1213
23 434	Dr. Deck's CV		1190
24 439	Dr. Mathew's CV	1254	1277
25 487	Ozone advisory, 2008	1241	1252

20 * * * * *

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1 P R O C E E D I N G S

2 CONTINUED DIRECT EXAMINATION OF LELAND B. DECK, Ph.D, BY MR.

3 GOODSTEIN:

4 Q. Dr. Deck, we were talking about Plaintiff's Exhibit 383
5 before the lunch break.

6 You were going over for us, starting with the top lines
7 on this table, how you identify these units for the
8 quantifying health facts that you quantified estimated fact
9 values for.

10 If you would continue to walk us through this table,
11 please. I think you were heading into the third line from
12 the top.

13 A. Right. As I mentioned on the mortality, what an
14 economist would like to measure is the willingness to pay
15 for a risk reduction. And that's a general goal for which
16 we achieved in mortality by measuring that.

17 However, for many of the rest of these endpoints, we're
18 not able to get that. There haven't been any studies done,
19 or sufficient numbers of studies done of the economic
20 valuation for each and every one of the endpoints.

21 Each one has a different story as to where it came
22 from. But the "Chronic Bronchitis Valuation" is a
23 combination of a willingness to pay study, but also with a
24 lost income component to it.

25 Because chronic bronchitis is a progressive and

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1 debilitating disease. And if you get chronic bronchitis
2 during your working years, you will have an impact on
3 your -- on your career stream. Whether you're out of the
4 work force or you're just working at some less than your
5 full potential, there will be an income impact there.

6 So again, the established peer view value of \$340,000,
7 that includes that income stream and the "Willingness to
8 Pay", with adjustments up to unit values.

9 The lag structure, by the way, only applies to
10 mortality. That's why that last column really is empty for
11 the rest of them.

12 The hospital admissions endpoints though, all three of
13 them, there are not "Willingness to Pay" studies available
14 for every kind of hospital admissions.

15 These instead are called, "Cost of Illness" based
16 studies. They are what the total medical expenditures are
17 for in the hospital and hospital directly related expenses.

18 Think of your total bill in the hospital, that the
19 hospital sends before your insurance kicks in. I mean,
20 that's what the concept is there.

21 Obviously that does not include like your own physician
22 that sent you to the hospital that you're going to
23 afterwards. So there are other direct medical costs that
24 aren't even reflected there.

25 But more importantly, it's only direct medical cost.

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1 My "willingness to pay", if you think about that, of staying
2 out of the hospital from breaking my leg, had very little to
3 do with what my medical bill for breaking my leg is.

4 There's a lot more pain and suffering and I want to
5 avoid that much more than the medical cost.

6 Therefore, these "Cost of Illness" estimates, because
7 they do not include anything that we call that pain and
8 suffering or the aggregate demand to reduce the risk, are
9 clearly underestimates of what the appropriate willingness
10 to pay value would be there.

11 School loss days are valued as a -- on a wage base.
12 There's some assumptions there that for every day a child
13 misses school, someone, an adult stays home with them and
14 hence misses work.

15 There's assumption that not everyone stays home is
16 necessarily working. So there's a workforce participation
17 adjustment downward. So that's a "Wage Based" value there.

18 Clearly, again, not what someone would be willing to
19 pay to have their child in school another day. That's just
20 not the basis of it. That's what we would like.

21 "Minor Restricted Activity Days" and "Asthma
22 Exacerbation", those are willingness to pay based studies.

23 So it's a little bit of a mix what we want is a
24 willingness to pay. Several of these that do contribute
25 significantly to the bottom line, if you will, the

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1 hospitalization, are underestimates of the unit values
2 there.

3 Q. And why did you decide to use EPA's values for each of
4 these health impacts?

5 A. These values have been -- have been -- have gone
6 through an extensive peer review process.

7 They've not only gone through EPA Science Advisory
8 Board, and actually several different boards as appropriate
9 for use in air pollution policy analysis.

10 But they've then also been vented through the public
11 comment process, where the regulatory impact assessments, or
12 the staff papers, depending on what the appropriate venue is
13 that EPA puts out.

14 These have all been -- had numerous opportunities to be
15 commented on. And indeed they have evolved and reflected
16 that.

17 It is a bit of a moving target, because as new studies
18 come out, new information, they are sort of continuously
19 updated.

20 Obviously more attention is paid to the ones that
21 contribute more to the bottom line. There's not a lot of
22 interest that's paid to updating the latest valuation of
23 "Minor Restricted Activity Days", because there's just less
24 new research on the smaller hitting items.

25 But certainly the "Health Cost Information" and the

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1 "Willingness to Pay" do get updated.

2 So I've gone with peer review established unit values
3 that use -- these explicitly came from what the EPA used in
4 the CAIR analysis. It has established a point in time.

5 They are still very much the foundation of what they
6 used in the -- up through 2008 Ozone Acts Valuation.

7 The minor details may have changed a wee bit because of
8 what year dollars we're in, but this is still very much the
9 foundation of what is used as recently as this year.

10 Q. And based on your experience, are these values the
11 generally accepted standard values for this type of
12 analysis?

13 A. Yes, they definitely are.

14 Q. And has the National Academies approved these values?

15 A. Yes they have. On two different occasions they've
16 approved the method, the concepts, as well as the explicit
17 numbers at that time.

18 When they reviewed, mainly PM NAAQS benefits analysis,
19 they reviewed them then, that was, I believe, 2002/2003.

20 And certainly their Ozone Risk Assessment Analysis also
21 had a chance to go through this same one.

22 And they spent considerable time reviewing the Value of
23 Statistical Life on that. Again, paying more attention to
24 the big hitter item than the lesser ones on the list.

25 Q. And what was the difference between the 1999 and the

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1 2006 unit values?

2 A. The 2006 prices and 2006 incomes are adjusting for
3 inflation between 1999 and 2006.

4 And the growth in real income -- which we defined as
5 the real gross domestic product per capita in the U.S --
6 that grows over time.

7 Between 1990 and 2006 it's an actual historical
8 adjustment, because we know what happens out in the future.

9 If we ever want to project future, then you have to
10 rely on projections of real GDP growth. We do not have to
11 do that here.

12 So real income adjustment is based on observed historic
13 data.

14 Q. All right. So let's now talk about the estimated
15 economic values that you provide in reports for the impacts
16 on these various health endpoints from TVA's excess
17 emissions, and then the benefits to public health that you
18 estimated that would be associated with the additional
19 controls sought by North Carolina.

20 Can you explain to us how you use these values to
21 calculate the total value of the benefits?

22 A. I used the unit values and took the geographic --
23 geographically detailed health estimates Dr. Levy and
24 Spengler produced, and was able then to produce the benefits
25 at that level of geographic resolution.

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1 In their report, I believe that they show tables at the
2 state level.

3 I believe I recall getting the estimates from them
4 actually at the county level, which is how they originally
5 estimated it.

6 So we really did this at that level, multiplying unit
7 values, times number of cases, for each of the endpoints,
8 and then adding them up.

9 And I reported them at the state level for each and
10 every state in the affected region, as well as summing up
11 across all of them.

12 (Plaintiff's Exhibit Number 384 was marked for
13 identification.)

14 Q. Okay. So let's go through your results. Let's start
15 with Plaintiff's Exhibit 384 for identification.

16 Can you explain to us what this table shows?

17 A. Yes. This is a table out of my expert report that
18 presents the health effect by health effect benefits.

19 This table is for 2013, the excess emissions reduction
20 in 2013.

21 This is using the population in 2000, which is what
22 Drs. Spengler and Levy used as their -- one of their
23 estimate points.

24 All of my aggregate benefit numbers, such as I'm
25 presenting here, are in, basically current dollars and

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1 income, specifically 2006 dollars, 2006 prices and incomes.

2 And so here in the first column I'm presenting the
3 benefits in North Carolina alone.

4 And this rather clearly shows, what I've alluded to a
5 few times, that out of the \$672 million of benefits, North
6 Carolina alone, 651 million of that comes from premature
7 mortality.

8 And in fact, most of that is adult premature mortality.
9 There is some infant mortality included in there.

10 Q. Is it correct, Dr. Deck, that this morality estimate
11 does not include mortality for people aged 2 through 30?

12 A. That is correct. It is the infant mortality estimates
13 are for neonatal infants, that is months, two months through
14 12 months.

15 The shortly after birth deaths are not included. There
16 is unfortunately so much of immediate loss of life there
17 that they don't estimate that.

18 So there's neonatal mortality. And then consistent
19 with what the major epidemiological studies have used, its
20 looked at adult, adult premature mortality.

21 That cutoff is not a reflection of, that's where the
22 health benefits end, 25-year olds are immune from this.
23 It's just in their cohort groups, that's what they examine.
24 And so the estimates are limited to where the cohort groups
25 went.

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1 And it was 29, I think was the initials of 30 up to one
2 year in. So yes, 30 and above.

3 Q. All right.

4 A. And then -- want me to go ahead?

5 Q. Yes.

6 A. After the North Carolina column, then I've added all of
7 the other states together in the domain.

8 That includes the entire states falling within the
9 modeling domain, plus those, you know, partial states that
10 are out on the edges is the aggregate of everything.
11 Getting the same exact basis leading to the total column on
12 the right hand side.

13 And again, 9.2 billion from mortality and the aggregate
14 I call rounded off, nine and a half billion dollars for the
15 2000 population.

16 (Plaintiff's Exhibit Number 385 was marked for
17 identification.)

18 Q. All right. And can you take a look at Plaintiff's 385
19 for identification? And can you explain to us what this
20 table shows?

21 A. Yes. This is a similar laid out table, same type of
22 information.

23 The difference in this table and the previous one, is
24 that this uses 2013 population. Everything else the same.
25 Same air quality change, same health -- you know, everything

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1 else the same, except with the larger population growth in
2 the intervening 13 years, you get 792 million in North
3 Carolina alone, or in the aggregate total, \$10.9 billion for
4 the aggregate.

5 Q. All right. Have you broken these results out by state?

6 A. Yes I have.

7 (Plaintiff's Exhibit Number 386 was marked for
8 identification.)

9 Q. I turn your attention to Plaintiff's Exhibit 386 for
10 identification. Can you explain to us what this table
11 shows?

12 A. Yes. As I mentioned earlier, the estimation was
13 actually done at, I believe it was the county, at least at
14 the state level.

15 So this is not new analysis, this is just reporting at
16 the more specific detail what -- where the, in this case,
17 nine and a half billion dollars -- that's 2000 population
18 numbers -- where they come from; how much fall within one
19 state or the next state.

20 This particular table is sorted by the largest dollar
21 amount at the top in descending order down, down within.

22 Earlier in the day, Dr. Levy presented a map with the
23 state -- states outlined, and the number of premature
24 mortalities occurring within each state.

25 This is really sort of a mathematical transformation of

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1 those number of deaths by state with the other health
2 effects included into a number of dollar benefits by each of
3 the state.

4 This is just in a table, as opposed to the map.
5 (Plaintiff's Exhibit Number 387 was marked for
6 identification.)

7 Q. Plaintiff's Exhibit 387 for Identification; can you
8 show us what that shows?

9 A. Again, a very similar table detailing state by state.
10 I want to point out that this one is sort of alphabetically,
11 as opposed to the dollar value.

12 But similar to the 2013 population, where the
13 \$10.9 billion comes from state by state.

14 Q. All right. Can you analyze the health benefits on a
15 county by county basis; is that right?

16 A. I can certainly value -- apply the unit values. In
17 this situation where I received the health estimates from
18 Drs. Levy and Spengler, I'm able to do it at the same level
19 of geographic resolution as I received from them.

20 There's -- in other times and situations, you can do it
21 at the level of the air quality modeling.

22 This was done, I believe I recall, at the county level,
23 and then aggregated up and reported out at the state level.

24 Q. And these results that you've given us at the state
25 level, those are based on the limited number of health

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1 endpoints that Dr. Levy and Spengler estimated and have
2 shown in previous tables.

3 A. Yes. They're only health endpoints that I identified
4 on previous diagrams. That's for ozone and PM combined.
5 But for that handful of eight endpoints, nine endpoints,
6 whatever the number of endpoints on that list is.

7 Q. So based on your analysis of the economic benefits of
8 the emissions reduction sought by North Carolina from TVA
9 plants, is there any reason from an economic standpoint, not
10 to include all the benefits that you've estimated in the
11 domain?

12 A. I view the role of an economist, putting it together in
13 benefit cost analysis, is basically to try to do a itemized
14 listing of all of the good things that will come from a
15 particular action -- and by that I mean the benefits -- both
16 in physical terms and in monetized dollar terms.

17 This is sort of the goal. This is what an economist
18 wants to do, is to list all the good things and all the bad
19 things or all the costs that will come associated with that
20 role.

21 An economist who is trying to rigorously follow the
22 benefit cost role, really wants to look at, do the benefits
23 exceed the cost, and by how much do they exceed the cost.

24 Economics though, is sort of humble in one dimension at
25 least, is stopping at the point of what -- who gets the

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1 benefits or who pays the benefits. That's an equity
2 decision.

3 And so, as the economist has their fingers on this
4 information about, in this case, working on the benefits
5 side, where the benefits are being realized.

6 It's important information to present to any
7 decision-maker about all of the benefits and where they're
8 coming from.

9 So that then the decision-maker can look at this and
10 decide what's relatively important and where are they coming
11 within each of them.

12 To only present say, a single line, say North Carolina
13 only, is not presenting information we already have, and may
14 be useful to the situation at hand.

15 Q. And did you prepare a summary of the benefits that are
16 not monetized in your analysis?

17 A. I have not prepared a monetization, nor even a
18 quantification of any benefits beyond what Drs. Levy and
19 Spengler did.

20 However, again, in this role of an economist of trying
21 to give a picture, a depiction in numbers or words or any
22 way I possibly can about what all the good is, I always feel
23 it's important to present information about, here's what
24 I've measured. And here's what we know that I haven't
25 measured, that isn't reflected in here.

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1 The concept is to try to convey the information about,
2 am I just looking under the lamppost and there's a whole lot
3 else out there. Have I got most of it and am missing some
4 other things.

5 It's to shed light on what else is not included in the
6 benefits numbers that I am presenting.

7 (Plaintiff's Exhibit Number 388 was marked for
8 identification.)

9 Q. I would like to show you Plaintiff's Exhibit 388 for
10 Identification, 388. And can you identify this summary that
11 you prepared?

12 A. Yes. This is a table from my expert report. And this
13 is a very standard type table, as I mentioned, important to
14 include in any depiction of what is quantified.

15 On the left side are the list separated by ozone and PM
16 about the quantified health effects.

17 In this case if they are quantified, I have also
18 monetized them.

19 On the right side are health effects that for one
20 reason or another don't make it to the left side, do not
21 have a valuation component to that.

22 All of those health effects are either known or
23 strongly suspected. In most cases there's at least a reject
24 the no hypothesis it's not going on, but there's something
25 lacking, either because economists haven't done our job well

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1 enough and we can't value them, and we don't have a
2 well-established peer reviewed valuation component to it.

3 Or sometimes there is a not a well-established
4 concentration-response function, not an agreement on how to
5 quantify the numbers.

6 But this picture is trying to -- it's do the, here's
7 what I've got, here's the rest of the picture in qualitative
8 terms, as opposed to quantitative terms.

9 (Plaintiff's Exhibit Number 389 was marked for
10 identification.)

11 Q. And you have a similar table, 389 for Identification,
12 that has additional benefits that are not quantified?

13 A. Yes, I do. If I could back up, there's one comment I
14 wanted to make. Excuse me.

15 Q. Sure.

16 A. The kind of table that we were talking about on 388,
17 Exhibit 388, it is in some sense a dynamic table.

18 Over time, as science progresses, things move from time
19 to time, back and forth.

20 There was a period of time when ozone premature
21 mortality was not a well-established endpoint. I always
22 included it on my unquantified endpoint, because there
23 wasn't an agreement on the quantification of that.

24 Since this period of time, the nonfatal heart attacks,
25 the myocardial infarctions, which now appear on the

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1 unquantified health effects, those in more recent analysis
2 I've done and EPA have done, are now migrated over to the
3 left hand side.

4 So it's a fine line on some of these about what we can
5 do and what we can't do. There have been times when
6 something was once on the quantified time, and science
7 progressed and, you know, it moved off of that for one
8 reason or another.

9 So this table -- type table evolves over time.

10 Q. All right. Plaintiff's 389 for identification, this is
11 additional unquantified health impacts related to the
12 emissions from TVA's coal-fired power plants?

13 A. Yes. This is again very much the same concept as
14 before. None of these are quantified. I just grouped them
15 into different health categories.

16 There will be SO2 emission reductions. SO2 is a health
17 risk in and of itself. We're not separately quantifying
18 those.

19 Nitrogen compounds, similarly, there are health
20 compounds from gaseous nitrogen, and from mercury as well.

21 None of those I have quantified here in my analysis, so
22 they're more, omitted benefit categories, that are not
23 included in my benefit analysis from these three specific
24 pollutants we have not analyzed.

25 Q. All right. And the second page of Plaintiff's Exhibit

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1 389 are non-health benefits that are not quantified in your
2 calculation; is that right?

3 A. Yes. These are also of the non -- I have not dealt
4 with quantification and valuation of these.

5 The visibility impacts will be discussed in subsequent
6 testimony. Visibility sometimes is valued and included.

7 That has not been my role here neither.

8 But these are all more benefits that are omitted.

9 Again, more of this conscious at the end of the day,
10 the bottom line, you know, if the economists all do their
11 job as well as they can and you get a benefit dollar number
12 and a cost dollar number, and trying to make sure that
13 everyone understands what is and what isn't in those
14 numbers.

15 These are non-direct -- these are non-human health
16 effects, all well-established, having relationships to ozone
17 and PM effects.

18 Q. Are there similar lists to the one that you've compiled
19 for purposes of your work in this case, in public documents
20 that present similar types of analysis?

21 A. Yes. I would say all EPA benefit cost analysis going
22 back, at least to the mid 1990's have actually a table that
23 looks much like this.

24 Work I was doing with them going back to the 80's, had
25 the same kind of information, but not in any kind of nicely

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1 teed up for easy presentation tabular form. There was
2 always an important section in the economic analysis about
3 omitted benefit categories.

4 Q. And are you familiar with the literature underlying
5 this list of unquantified benefits; these lists that are
6 contained in your report?

7 A. Yes, I am. This list on the current table here, I have
8 done quantification and valuation of each and every one of
9 them much of my -- I take it back.

10 I have not valued damage ecosystem functions.

11 But every other one here I have done and included
12 analyses, published methods and certainly published results
13 in numerous RIA's at various times.

14 Each one has a whole analytical chain to estimate the
15 agricultural yield loss and the impact on market going
16 prices.

17 Each one got a whole chunk of analysis that goes with
18 it.

19 Q. And what is your -- what is the impact of excluding
20 these effects from your economic analysis? What impact does
21 that have on your estimates?

22 A. It leads to the numbers I present are an underestimate
23 of the monetized benefits. Many of these are actually
24 monetizable, but just have not been in this context.

25 So my bottom line economic benefits is an underestimate

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1 of the total monetized benefits because of omitted benefit
2 categories.

3 MR. GOODSTEIN: Your Honor, at this time I would
4 offer some exhibits into evidence; 434 is Dr. Deck's CV; 383
5 for identification are the unit values; 384, 385, 386 and
6 387 are the results table; and 388 are the quantified and
7 unquantified health effects; and 389 are unquantified
8 benefits.

9 We will offer these into evidence at this time,
10 Your Honor.

11 THE COURT: Let those be admitted.
12 (Plaintiff's Exhibit Number 434, 383, 384, 385, 386, 387,
13 388, 389 having been marked, were received in evidence.)

14 MR. GOODSTEIN: Thank you.

15 Q. (Mr. Goodstein) All right. Dr. Deck, let's talk about
16 benefit-cost analysis which you referred to earlier in your
17 summary.

18 In order to perform benefit-cost analysis as you
19 mentioned earlier in your testimony, you had to estimate the
20 annual cost of the additional air pollution reduction sought
21 by North Carolina from TVA in this case; is that correct?

22 A. Yes.

23 Q. Can you tell us how you went about doing that?

24 A. Yes. I received several versions of cost information
25 from Dr. Staudt.

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1 I initially received his cost estimates in his original
2 expert report, that showed an initial cost estimate of
3 \$3 billion. Plus then during the operating life of the
4 controlled equipment -- I guess remaining operating life of
5 the plant control, of \$220 million per year.

6 Yeah, this is a lumpy kind of a cost stream. I've got
7 this large, upfront investment cost of the 3 billion, and
8 then the stream of continuing payments.

9 Using a standard technique that's really very similar
10 to amortizing a mortgage or doing a bond calculation, I
11 mean, it's really kind of a straight-forward kind of
12 analysis, using a 7 percent cost of capital to annualize
13 those costs. And that 7 percent is government guidance on
14 how to do a -- on what to use as a cost of capital for this
15 amortization analyzation kind of an exertion.

16 I was able to convert that lumpy upfront cost and
17 stream to follow costs into a single annualized equivalent
18 number.

19 So Dr. Staudt's original estimates come out to
20 \$516 million per year, over the remaining life of the plant
21 to operate this level of control equipment. That's how you
22 get across the old affected plants.

23 Q. All right.

24 A. Similarly, I got updated results from Dr. Staudt's
25 subsequent reports. I did exactly the same type of thing

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1 with two other cost estimates I received from him. The O&M
2 costs actually stayed the same.

3 But the upfront capital investment cost, I did it for
4 Dr. Staudt's analysis in his supplementary report that were
5 derived from the TVA's experts cost estimates, and I also
6 did it for the TVA's, Mr. Scott's and Nash's estimates
7 themselves.

8 So just three alternative amortizations annualization.
9 (Plaintiff's Exhibit Number 390 was marked for
10 identification.)

11 Q. I want to show you Plaintiff's Exhibit 340 for
12 Identification. And can you identify this table -- I'm
13 sorry 390.

14 A. No I cannot.

15 Q. I'm sorry, 390. I just wanted to see if you're on your
16 toes, Dr. Deck.

17 Sorry about that. Does this one look more familiar?

18 A. Yes. This looks more familiar, yes.

19 This is information in, I believe, from a table -- I
20 believe from my supplemental report, because of the updated
21 cost estimates that are in it.

22 Q. All right. So can you walk us through this and explain
23 to us how you arrived at these benefit-cost comparisons?

24 A. Sure. The top three lines I was just talking about,
25 how I've taken the cost estimates.

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1 Then on the next two lines are repeating information on
2 my previous exhibits, the North Carolina alone benefits, for
3 \$672 million. These are all with the 2000 population. One
4 is sort of middle block on this. And also the total
5 benefits. Always presenting side-by-side, North Carolina
6 only and the total.

7 And then I've calculated here and present the benefit
8 cost ratio. So the number 1.3, which is down there in the
9 first column, that is, you know, it is the division of
10 putting the benefits over the cost, the 672 million divided
11 by 516 million, that's 1.3.

12 Now, there's a lot of -- a lot of time benefit-cost
13 ratios are misused and misunderstood.

14 An economist most wants to talk about what the net
15 benefits are. Are benefits larger than cost, and if so by
16 how much. That's the most appropriate economic item of
17 concern.

18 But a benefit-cost ratio tells us though, is some
19 important information about how sensitive the results are to
20 the assumptions going in.

21 So our total benefit-cost ratio, this is the
22 9.5 billion divided by 516 million at 18.4.

23 That indicates that you could vary the assumptions
24 going in, vary the number of deaths by, you know, up or down
25 by a factor of 2, just for instance, or the value of

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1 statistical life up or down by a factor of 2, and you would
2 not change the total benefit cost, you know, outcome, in
3 terms of, is it larger than 1, looking at the entire
4 picture.

5 So it's-- the benefit-cost ratio is best utilized as a,
6 how close are the two. If they're 18.4 to 1 or down for the
7 2013 population, up to 21 to 1, now that's, you can vary the
8 assumptions a lot and still the benefits will exceed the
9 cost.

10 That's the appropriate use of a benefit-cost ratio.

11 Q. So what did you determine to be an annual equivalent
12 cost for the additional emissions reductions sought by North
13 Carolina from TVA?

14 A. I'm sorry. Could you repeat that?

15 Q. The annual equivalent costs?

16 A. Depending on the cost estimates, they're between
17 516,000,000 and 718,000,000, depending on which assumption
18 you use.

19 Now, we've heard testimony that these are from the
20 original numbers coming out of the expert reports. We heard
21 testimony in this trial that there's a fuel cost savings
22 that these have been characterized as being higher estimates
23 of the annual equivalent costs. I did not have or use that
24 particular information.

25 But as these analyzed cost numbers would be reduced by

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1 the fuel savings, that would be decreasing the denominator
2 in the benefit cost calculation, and hence increasing the
3 overall cost.

4 Simple math, if the cost was half as much, the
5 benefit-cost ratio would be twice as high.

6 Q. So what you're saying is that, with consideration of
7 fuel savings as testified to by Dr. Staudt, the benefit-cost
8 ratio would be even higher?

9 A. That is correct. The benefits would stay the same, the
10 costs would go down. Therefore the benefit-cost ratio would
11 go up.

12 Q. From an economic standpoint, how would you describe the
13 total benefit-cost ratio that you have for these various
14 scenarios?

15 A. Looking across the entire region, regardless of your
16 costs, which are cost assumption, making the benefits exceed
17 the cost by a large margin.

18 Using the 2000 population, by a factor of 13-fold to
19 18-fold larger.

20 So it clearly passes the de minimis benefit-cost ratio,
21 is -- are the benefits larger than the cost; yes, they are,
22 by a considerable amount.

23 Q. What about if you look at just benefits in North
24 Carolina?

25 A. Benefits in North Carolina, I would characterize it as,

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1 the benefits in North Carolina essentially are pretty close
2 to what the costs are. So North Carolina benefits alone,
3 cover the cost of the whole program.

4 That varies a little bit with the Staudt supplemental
5 report estimates, the benefit cost is .105, pretty much the
6 same kind of thing. For lower cost it goes up a little.
7 For the higher cost estimate, you know, it's down to .94.

8 But in all years and all analyses, benefits in North
9 Carolina alone, are very comparable to the estimated cost
10 without the fuel saving.

11 Q. And without all the non-monetized benefits?

12 A. Right. The monetized -- quantified and monetized
13 benefits, North Carolina is comparable to the entire costs,
14 and depends on the details, just how close that
15 comparability is.

16 Q. All right. Did you consider whether any of these
17 benefits would accrue directly to the State of North
18 Carolina?

19 A. Yes I did. In my expert report I considered this, and
20 I located some information on this topic.

21 As the health analysis in my economic benefit analysis
22 has already shown, many of those benefits, \$672 million of
23 those benefits accrue in the state -- within the State of
24 North Carolina.

25 Some of those will be -- or all of those in one fashion

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1 or another will be accruing to the citizens of North
2 Carolina.

3 This will also have an impact on the health care system
4 that goes on within the State of North Carolina.

5 To the extent that some of that health care cost is
6 born by the state or county governments, as the demand or
7 the need for health care goes down, the expenditures on
8 health care by both the state and county levels will go
9 down.

10 In my expert report, as an example of this, I took a
11 look at what the Medicaid expenditures within North Carolina
12 are.

13 And I did not go down the path, if you will, of -- by
14 any means, breaking it out by health endpoint or health
15 endpoint, but just looking at the aggregate health care.

16 The aggregate expenditures for health care in fiscal
17 2005 was \$8.2 billion.

18 Of that \$8.2 billion in health care the state picked up
19 almost a third of that, \$2.6 billion. The counties picked
20 up another 427 million of that.

21 So those would be -- to the extent that the improvement
22 in health, decreases use of health utilization, that's
23 the -- a term we use -- that's what's at stake. That's the
24 total health care expenditures I just read. And those would
25 be getting smaller as health gets better, provided a little

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1 bit --

2 Q. Excuse me just one second, Dr. Deck. I just want to
3 refer the Court to page -- Exhibit 477 page 20.

4 Is that where this portion of your analysis is
5 contained, Dr. Deck?

6 A. Yes it is. It's on page 20 of my original expert
7 report, Exhibit 477. And it goes on to 21 as well.

8 Q. Okay. So you had just provided to us the \$8.2 billion
9 number. Can you describe for us what that number
10 represents?

11 A. That is from the State Health Service Reports of the
12 aggregate Medicaid expenditures for health care in the State
13 of North Carolina into 2005.

14 Medicaid obviously provides health care for a portion
15 of the population, approximately 18 percent of the
16 population is eligible for Medicaid at one point or another
17 during the year.

18 So this is only -- this whole Medicaid presentation is
19 only talking about a portion of the health care costs going
20 on within the State of North Carolina.

21 Q. All right. Have you read expert reports from TVA's
22 expert including Dr. Anne Smith?

23 A. Yes I have.

24 Q. And did you adjust your analysis in any way as a result
25 of reviewing those expert reports?

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1 A. No I did not.

2 Q. And did you agree with Dr. Smith's comments that only
3 benefits in North Carolina should be considered in your
4 analysis?

5 A. No. I most certainly do not agree that that is all
6 that should be presented in the analysis.

7 As I made the point earlier, it's important I think to
8 represent all of the good things that come from the
9 result -- from an action such as reducing excess emissions,
10 and present information on where those are occurring.

11 Again, showing what the equity is, who gets them.

12 By only showing one of the -- one state, then doing
13 analysis only limited to that, I don't think that -- such as
14 Dr. Smith has done -- I don't think that's a particularly
15 complete or balanced picture of what we know about what's
16 going on with the benefits.

17 How the Court chooses to evaluate the different equity
18 issues that's going on, that's not an economist's job to do
19 that. It is incumbent on us to present the information.

20 Q. Is there anything from an economic analysis standpoint,
21 any theory or principle of economic analysis, that would
22 suggest that you should limit your evaluation of benefits in
23 this type of air pollution control program analysis?

24 A. No, not at all. From a applied policy point of view,
25 Dr. Smith raised that OMB's own guidance says that the focus

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1 of economic benefits analysis should be within the United
2 States. I have met that challenge.

3 Furthermore though, from a more fundamental basic point
4 of view, I don't think that there's ever any reason to
5 selectively choose to only look at some of the benefits, in
6 this case, at benefits that some of the people get.

7 Whether in the end you want to -- how you want to weigh
8 who gets them in the decision, that's an equity, not an
9 economic issue.

10 Certainly if there was a policy that could -- that
11 could help people by a million dollars, and one option gave
12 that million dollars to Bill Gates, and the other option
13 gave that million dollars spread over other people, I have a
14 personal preference between those.

15 But that's an equity judgment, that's not an economic
16 judgment. That's not an economic analytical result of that.
17 Q. Is your presentation of benefits that you did in this
18 case, is that consistent with your experience doing benefit
19 analysis for air pollution control programs?

20 A. Yes, very much. In fact, in previous years, say up to
21 and perhaps a decade ago, EPA was not in the practice of
22 reporting benefits at a smaller geographic resolution.

23 They only presented it as sort of national aggregate or
24 regional aggregate, if that was the case.

25 EPA received a lot of criticism for doing this. And it

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1 was frankly a lot of criticism from the industry side that
2 wanted revelation of, you know, more information. What are
3 the sources of the benefits. Who are getting it. They
4 wanted to see air quality maps. They wanted to see the
5 health estimates. They wanted to see where the dollar
6 benefits are coming from.

7 All in the issue of, you know, more transparent
8 analyses so people could see what the heck was going on.

9 EPA has certainly evolved very much in that direction,
10 and now they routinely put out this kind of analysis.
11 Typically at state-by-state level it's easy to present, but
12 it's always available at -- down to the lowest level of
13 geographic resolution that is actually used.

14 Q. Okay.

15 A. That's also true going across international borders. A
16 lot of work I do for the EPA Acid Rain Program is about
17 impacts in Canada, our air is their air. It's important to
18 present the information. How it weighs in the decision is
19 again -- but there's no reason to arbitrarily put lines on
20 information.

21 Q. Let's talk about Dr. Smith's comments with regard to
22 the value of a statistical life that you used in your
23 analysis.

24 What was your reaction to Dr. Smith's comments about
25 the value of statistical life that you used?

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1 A. I do not agree with her overall recommendation. I do
2 not agree with what she called her, I get the adjectives
3 right, the "less unreasonable" valuation that she proposed
4 to use, which I believe was \$2.3 million.

5 I certainly do not agree with her opinion that the
6 consensus of the economics' profession is at the -- a number
7 more in line with her is -- reflects the consensus of the
8 economics' profession.

9 There has been a, as I alluded to earlier, a lot of
10 research, a lot of formal meta-analysis of this issue, just
11 like we heard from Dr. Levy they do on the health side, as
12 well as extensive peer review on this analysis.

13 EPA Science Advisory Board, in their last explicit and
14 detailed review of this by the Environmental Economics
15 Advisory Committee of the Science Advisory Board, reviewed
16 this literature, and they came down to having three
17 published meta-analyses that they looked at carefully.

18 One of them was meta-analysis by -- that they concluded
19 that these were all pretty good summaries of the literature.
20 There was differences between each of them. They're all
21 looking at 200 and some odd different studies, their methods
22 of how they went about, differed.

23 They selected one of the three meta-analysis was by
24 Mrozek and Taylor, 2002.

25 And the Mrozek -- any time you have a list of three --

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1 a list of three numbers, one's going to be high, one's going
2 to be low, and one's going to be in the middle, because
3 that's the way it works out. The Mrozek estimate was the
4 lowest of the three.

5 But the meta-analysis that was impressive at the time
6 that they reviewed it, it has since been published by Koshi,
7 Hubbard and Cramer, 2006, that's kind of middling,
8 5.4 million.

9 And then one by Viscusi and Aldy, again another
10 meta-analysis. And their mean estimate -- these are the
11 mean estimates I'm talking about.

12 The Mrozek and Taylor was around 2 point something,
13 2.2 million. Koshi and Hubbard 5.4. Viscusi and Aldy,
14 8.3 million.

15 They thought that -- the scientific peer review, all
16 thought those were good summaries.

17 In the opinion of the Environmental Economics Advisory
18 Council, they recommended the primary emphasis be on the
19 Viscusi and Aldy estimate, the \$8.3 million for the value of
20 statistical life.

21 As EPA has done from time to time, they decided not to
22 follow the advice of the Scientific Advisory Board, exactly.

23 They instead -- EPA has decided to use a range. And
24 they have established the range as being 1, the low end,
25 coming from Mrozek and Taylor, specifically the 25th

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1 percentile confidence interval in Mrozek and Taylor, which
2 is \$1 million.

3 And the comparable, the 75th percentile compensable of
4 Viscusi and Aldy, that comes out to 10 million.

5 So that's explicitly where EPA comes up with their 1 to
6 \$10 million range, based on these two.

7 And the midpoint of that is 5.5, which is very
8 consistent with the Koshi estimate of 5.4.

9 So that I think is a reflection of where the consensus
10 of the science of value of statistical life is. That's what
11 EPA has been using.

12 The National Research Council reviewed that in some
13 detail again, in their recent study that just came out on
14 ozone risk value is, and they concurred that the best
15 scientifically available information consensus of the -- of
16 economics is EPA's current practice of 1 to 10 with a mean
17 of 5.5.

18 After these reviews by other exhaustive and peer
19 reviewed panels, I conclude that Dr. Smith's statement that
20 my \$5.5 million number is not -- is out of the main stream
21 and not consistent with modern economic thought, I do not
22 agree with that conclusion.

23 Q. And how would you describe the value that she
24 recommends using her analysis?

25 A. Her analysis -- her "less than reasonable value", as

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1 she characterized it, comes from Mrozek and Taylor. She
2 uses that as the main source of her analysis. So that is
3 the low -- her source is the lowest end of the credible
4 range that EPA is using.

5 Q. Did Dr. Smith provide comments to the recent National
6 Academies proceeding regarding ozone?

7 A. On the value of statistical life; yes, she did that.
8 She has provided input to every one of the peer review
9 processes I've talked about, her resume shows going back to
10 '94 or something like that.

11 Q. Let's talk about the most recent proceeding on ozone
12 before the National Academies, and her comments in the
13 record in that matter.

14 Were those comments adopted by the National Academies?

15 A. No. At the time of her deposition, which I attended,
16 she discussed the proceedings of the National Academies.
17 She gave testimony there. And she gave testimony about part
18 of the public discourse that went on, what the committee was
19 talking about, the panel was talking about in the public
20 meeting there.

21 And she characterized those discussions as expressing
22 concern about the central Tennessee of five and a half
23 million.

24 Also the concern about the home -- about the use of
25 homogeneous value of statistical life, such as EPA is using.

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1 Meaning all premature mortality is valued the same, as
2 opposed to breaking it up and using different values by
3 health or age or income or anything else, but a single
4 homogeneous value.

5 She expressed concern -- she relayed that that's what
6 the conversation was about among the panel members.

7 When the final report came out this year, the National
8 Academies, National Research Council, spoke specifically and
9 precisely about not using homogeneous -- not using
10 heterogenous valuation, excuse me.

11 But that the state of the science now does not
12 support -- there's no consistent evidence that there is
13 heterogenous valuations. And that again, as I said, EPA's
14 range and midpoint is an appropriate reflection.

15 Those were not Dr. Smith's opinions which she expressed
16 to the Academy. Nor do I see the sort of characterization
17 of their discussion as she said, and I'm sure that
18 discussion she heard accurately, but it's not reflected in
19 their final outcome at all.

20 Q. And did that recent National Academies panel confirm
21 the EPA values as the best values to use?

22 A. Yes, it does.

23 Q. Let's talk about Dr. Smith's comments regarding the use
24 of a plant-by-plant marginal analysis. Why didn't that
25 convince you to change your approach?

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1 A. I -- what I did in my approach was, we -- and as well
2 as my -- the other experts that I'm working effectively with
3 their results upstream, analytically, if you want to call it
4 that, and here from me, we were looking at the costs and
5 benefits of the relief sought by the State of North
6 Carolina.

7 As Dr. Staudt emphasised, there's a lot of different
8 possible ways that even that cap could be implemented.
9 Different plants could be doing different things. Even
10 meeting the one cap is virtually an infinite variety,
11 permutations of how that could be done.

12 Going beyond that -- the overall cap that North
13 Carolina is seeking there's, I guess a higher order of
14 infinite -- of using mathematics terribly there -- about how
15 many more permutations of doing this plant or only that
16 plant or a third of this plant, you can just go on and on
17 and on. We have not done that analysis here.

18 Her comments of what we have not done is a marginal
19 analysis. Those I disagree with.

20 There have periodically been poorly done economic
21 benefit cost analysis looking at the value of everything all
22 at once. For reasons I don't personally understand, there
23 was an article in Science, in the late 1990's, it estimated
24 the value of the environment.

25 So sort of the control -- or the baseline is we have an

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1 environment. The control is, we don't have an environment.

2 I don't quite understand what his alternate scenario
3 was. That is not a marginal analysis. That is doing
4 everything all at once, taking away.

5 What we have done here is a marginal analysis. There
6 is a status quo. The baseline as is. We're looking at a
7 change off of that, and that is a marginal analysis.

8 Which Dr. Smith in her -- I forget which go-round of
9 the reports it was, that she agreed to, that that was not
10 the kind -- that what I had done, was not that it was not a
11 marginal analysis, it was just not the plant-by-plant kind
12 of analysis that she would prefer to be done.

13 Basis of information, it would be great if we could do
14 the emission estimates and the air quality modeling for a
15 wide range of possible permutations.

16 That's analytically not what we've done, and would be
17 analytically, very difficult to do that.

18 In her plant-by-plant analysis, she did only report the
19 results in North Carolina, we talked about earlier. And
20 that, I believe, affected her conclusions that only,
21 certain -- only, I think one plant, the John Sevier plant, I
22 think, only by that, limited North Carolina, only passed her
23 own benefit-cost analysis.

24 Q. So even using Dr. Smith's approach, she concluded that
25 the projects outlined at the John Sevier plant were cost

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1 effective?

2 A. And I believe that was using my methods and inputs.
3 Meaning, you know, what I consider the state of the science,
4 valuation and health effects, et cetera. That passed it
5 alone.

6 We asked her in her deposition whether she had indeed
7 done all of the analysis for the other states. And she did
8 not report them, and I believe she said that no she had
9 not -- she had never captured them, she had just not looked
10 at all of them.

11 It's somewhat, given my knowledge of how you go about
12 doing this with an air pollution model, it's sort of hard to
13 avoid doing the analysis every place.

14 But then it's a matter of what you capture and what you
15 choose -- what you choose to report.

16 Q. All right. And finally, Dr. Deck, when you read
17 Dr. Smith's comments regarding uncertainty in your analysis,
18 did that cause you to reconsider any of your work?

19 A. No it did not.

20 Q. Can you explain to us why?

21 A. In my report I discussed the quantitative uncertainty
22 bounds around, especially the mortality, and just testified
23 to in court here, a good bit more about which is, you know,
24 information that's in my expert report about what the
25 uncertainty is there.

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1 I did not run the numbers, so to speak, to do the
2 calculation. It's, you know, very obvious how to do that.

3 I think though, it's misleading and dangerous for an
4 economist to only do -- I'm sitting at the end of the
5 pipeline, the end of the analytical pipeline -- to apply one
6 factor of uncertainty, basic value of statistical life
7 uncertainty.

8 After we have basically point estimates, single
9 estimates of everything else upstream, and then do it at the
10 end, you very much run the risk of presenting -- here's the
11 benefit-cost analysis, here's the uncertainty around those
12 benefits.

13 And it can give the impression -- it gives the illusion
14 that, oh, that's the complete, the composite uncertainty
15 around everything going in that we're comparing with the
16 costs. And that's wrong. That would never be the intention
17 of doing that.

18 It's been my experience it's often misinterpreted by
19 someone reading quickly going, oh, there's the uncertainty.
20 Okay. Fine. I'm done. And that's a misleading
21 possibility.

22 Certainly from the valuation side alone, the
23 benefits -- uncertainty analysis as I present, the benefits
24 could be twice as large as what I've presented them. They
25 could also be 20 percent as small, within that wide range of

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1 uncertainty that EPA has.

2 But I've addressed uncertainty on the critical
3 component I've got. And have presented the mean estimate,
4 the best credible scientific estimate of what the mean is.

5 And all the information is available for my -- to do
6 the limited form of uncertainty analysis on the entire
7 spectrum of health benefits on the valuation side only.

8 I don't have the information about doing the health --
9 the emissions uncertainty, the air quality uncertainty, that
10 would really go into a more complete uncertainty analysis.

11 This is very similar to what Dr. Levy testified to this
12 morning. He's sort of sitting in a similar analytical
13 chain. And he did, you know, they presented and discussed
14 information on their uncertainty and used the mean.

15 I've done very much the same here for fear of
16 misleading, really.

17 Q. So based on your experience, Dr. Deck, and your
18 analysis in this case, have you described the estimates that
19 you've provided to us for the economic benefits associated
20 with the reductions in emissions sought by North Carolina
21 from TVA in this case?

22 A. The methods I have used, and hence the results that I
23 have used using those methods, apply the best current
24 available scientific information, economic science -- if you
25 want to call it that -- information on, as to what the best

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1 estimate of benefits are, within a reasonable degree of
2 certainty, given the current state of the science.

3 Q. And what about your estimates regarding current
4 economic impacts of TVA's excess emissions from their
5 coal-fired power plants?

6 A. To the extent that TVA's projected excess emissions for
7 2013 are consistent with their current -- excuse me recent
8 estimates -- I'm sorry, recent excess emissions, the
9 benefits would be comparable with the same reflecting of the
10 currently available science information as the best
11 available benefits estimates of their current -- of their
12 current excess emissions.

13 MR. GOODSTEIN: If I could have a moment, Your
14 Honor?

15 THE COURT: All right.

16 MR. GOODSTEIN: Your Honor, I offer 390 into
17 evidence, which is Dr. Deck's benefit-cost summary.

18 THE COURT: Three --

19 MR. GOODSTEIN: Plaintiff's 390 for
20 identification.

21 THE COURT: Right. Was there another one?

22 MR. GOODSTEIN: I think that's the only one left
23 that I haven't offered up.

24 THE COURT: Did you have 477 in? I guess -- yes
25 you did.

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1 MR. GOODSTEIN: Expert reports should be in, Your
2 Honor.

3 477, 478 and 479 I believe we offered them
4 earlier, but I'll offer again to make sure.

5 THE COURT: I have them admitted.
6 (Plaintiff's Exhibit Number 390 having been marked, was
7 received in evidence.)

8 MR. GOODSTEIN: All right. And we have no further
9 questions of Dr. Deck at this time.

10 THE COURT: All right. Mr. Lancaster.

11 CROSS-EXAMINATION BY MR. LANCASTER:

12 Q. Dr. Deck, Dr. Staudt started the ball rolling with
13 emissions estimates for TVA in the year 2013, both a base
14 case and a controls case, correct?

15 A. That's correct.

16 Q. And he made the handoff to Mr. Chinkin and Mr. Wheeler,
17 who ran those numbers through computer modeling, correct?

18 A. That's correct.

19 Q. And Mr. Wheeler and Mr. Chankin made the handoff to Dr.
20 Levy, who turned those outputs into a precise number of
21 premature mortalities avoided, correct?

22 A. That's correct.

23 Q. And then the handoff was made to you, to give you the
24 unenviable task of putting a value on human life, correct?

25 A. And then explaining how the beginning reflects to the

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1 end; yes. Yes, sir. That's my job.

2 Q. And to value the reduced risks of premature mortality,
3 you use something called the value of a statistical life,
4 correct?

5 A. That's correct.

6 Q. And in your business that's called VSL for short?

7 A. Correct.

8 Q. And you derived your VSL estimate, using a methodology
9 based on what's called a "willingness to pay" concept,
10 correct?

11 A. The goal is to have a willingness to pay the VSL as we
12 estimated attempts to use willingness to pay, just the
13 order.

14 Q. Well, for example, the amount of additional wages that
15 people are paid, per unit of additional risk of fatal injury
16 on their job, may reveal the trade off the individual is
17 willing to make between additional risk and additional
18 income, correct?

19 A. That is one of the two different types of analysis that
20 are used in the current literature for estimating VSL.
21 That's called a hedonic wage approach.

22 Q. And it's analyses like that, that economists use to try
23 to come up with a value of a statistical life, correct?

24 A. That is one body of information, one type of research
25 that is used. The advantage of that is that those are real

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1 world transactions. There is real money and real decisions
2 being made. And there's some people have a lot of comfort
3 with looking at what's called "revealed preference".

4 And I'm trying to tease out of what's the risk premium
5 basically in jobs. That's one type of analysis basis.

6 Q. Correct. And that is the type of analysis that
7 underlies your value of statistical life that you used here,
8 correct?

9 A. No, sir. That is one -- there are several kinds of
10 analyses. The revealed preference -- back up a little bit.

11 What my numbers explicitly rely on are the
12 meta-analysis of different studies out there.

13 Meta-analysis look at all literature to identify good
14 valid studies that meet certain criteria and that are
15 useful. And then do various statistical analyses to form a
16 central estimate of that.

17 Of the studies that are included in those
18 meta-analysis, some of those studies are revealed preference
19 wage hedonic studies. Others are stated preference studies.

20 So there are both kinds of studies in the -- underlying
21 the basis of the VSL, as you characterized it, are both wage
22 based studies and stated preference studies.

23 Q. And the Mrozek, M-R-O-Z-E-K and Taylor study that you
24 cited, that was a study based on estimates of wage premiums
25 for increased risks of fatal accidents on the job, correct?

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1 A. Yes that -- that is correct. Their selection criteria
2 of what they included in their meta-analysis included wage,
3 wage studies. And if I remember accurately, they also had
4 other criteria, U.S. only, and certain other criteria.

5 But they chose to use wage studies only in their
6 meta-analysis.

7 Q. And likewise, Viscusi, V-I-S-C-U-S-I, and Aldy, A-L-D-Y
8 was also based on estimates of wage premiums for increased
9 risk of fatal accidents on the job, correct?

10 A. Yes. That is correct.

11 Q. These are the two meta-analyses that give rise to your
12 VSL correct?

13 A. As I said, there were three meta-analyses that gave
14 rise to my VSL. The Koshi, et al, is a third meta-analysis.

15 The Koshi study -- actually all these studies report
16 multiple findings. That's the way that good science is
17 done; different model specifications.

18 Koshi, et al, reported wage studies only, stated
19 preference studies only, combination of the two. They tee
20 it up in a variety of different ways. But it's the three
21 meta-analyses that are used as the basis to form the
22 decision about five and a half million dollars.

23 Q. These wage studies, they are usually based on study
24 populations of largely healthy workers, correct?

25 A. The study populations vary a good bit. As I recall

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1 there are approximately 50 studies that are wage studies
2 that are included in one of these or the other.

3 It's probably -- I can't summarize what's the plurality
4 within that -- a group of studies. They are studies of
5 employed people.

6 And those seem -- but I can't -- I can't specify to
7 whether the health of the workers was an explicit part of
8 any or all of the wage studies.

9 Q. Is there an implicit assumption about the number of
10 years of life lost, embedded in the value of statistical
11 life that you used?

12 A. No, there is not. The value of statistical life I used
13 came from these is the -- a measure of the demand for, or
14 willingness to accept little higher wages for the risk of
15 dying in a -- usually within one year, within an annual
16 period.

17 In the wage context, how an individual -- what wage
18 premium they demand in the marketplace, as individuals they
19 may be considering their age, their life structure, their
20 family, et cetera, et cetera.

21 But the analysis itself takes those revealed
22 preferences in their wages as a given, and goes from that.
23 There's a variety of wage studies in there. Some of those
24 risks are quite imminent. Others are from chemical workers,
25 exposure, there's all kinds of different health risks on the

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1 job. Again, depending on who they are looking at.

2 Q. So the value that you used, which was \$7.25 million in
3 2006 dollars, is it your testimony that would be the value
4 of the life, whether it was one day of life lost or whether
5 it was 40 years of life lost?

6 A. Yes. That is how it is applied upon, and that is what
7 the peer recommendation of -- you know, that is EPA's
8 practice at this time.

9 At the limits, that is a uncomfortable assumption.

10 If a 99-year old terminal emphysemic were to be dying a
11 week early, for instance, in one extreme example I'm setting
12 up. If that's one type of loss of life. Versus say a
13 one-month old infant, who if they survive the current insult
14 that they have, and would live otherwise their whole life
15 span, have a healthy life.

16 As an individual expressing my own preferences, no,
17 those two are not -- I have a preference for which of those
18 risks I would rather reduce.

19 The scientific information we have on value of
20 statistical life, has not been able to, sort of, parse it
21 down to that level. We have a euphemism we call it, one
22 size fits all, kind of a number.

23 There is an important policy issue, about whether in a
24 government regulatory analysis, or a government proceeding,
25 should all people be treated equally in an analysis and in

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1 the consideration of the decision-maker, regardless of their
2 age or health status or income, or should we go to
3 heterogenous valuation.

4 That's a second question. So there's two issues. The
5 ability of economics to measure. Then what we would want to
6 do in an analysis if we could measure that.

7 Q. Didn't mean to ask for quite that much information,
8 feel free to answer this one yes or no if you can.

9 Is it the case that your \$7.2 million figure has no
10 assumptions whatsoever about the amount of life lost; is
11 that correct, in terms of years?

12 A. That is correct.

13 Q. Thank you. Now in your analysis, you took into account
14 alleged benefits, not just in North Carolina, but to 30
15 other states as well, correct?

16 A. That is correct.

17 Q. Indeed, you took into account air quality benefits
18 alleged to occur from reducing air pollution in states as
19 far away as Wisconsin, Nebraska, Connecticut, Ohio; is that
20 correct?

21 A. I took into account health benefits accruing within the
22 modeling domain, wherever there were model changes in PM2.5
23 and ozone, wherever those occurred.

24 Q. Including states like Wisconsin and Ohio, correct?

25 A. Yes.

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1 Q. In fact, in your opinion, 93 percent of the alleged
2 benefits you quantified, will accrue in states other than
3 North Carolina?

4 A. That is the results of my analysis. Yes. That's what
5 it shows.

6 Q. And only 7 percent of the value of the avoidable health
7 effects that you calculated, are alleged to occur here in
8 North Carolina; is that correct?

9 A. Yes. That is correct.

10 Q. And the only way you get to numbers like 9 or
11 \$10 billion of benefits, is by including alleged impacts in
12 over 30 states; is that correct?

13 A. I get to numbers like 9 and \$10 billion by looking at
14 the impacts of everyone that's exposed from the excess
15 emissions, regardless of where those people live.

16 For North Carolina alone, as I testified, the benefits
17 are on the order of 700 to \$800 million in round numbers.

18 Q. You testified, I believe, that to the extent TVA's
19 current emissions are the same as they are projected to be
20 in 2013, then the current benefits are, in your opinion, the
21 same, correct?

22 A. The excess emissions. Reducing those excess emissions
23 that would be the same.

24 Q. And you chose as an example to use the year 2006,
25 correct?

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1 A. Yes I did.

2 Q. And you're aware that in 2007, TVA sulfur dioxide
3 emissions were already about 75,000 tons below what Dr.
4 Staudt had projected for the year 2013, correct?

5 A. I heard that testimony here in court, which means we're
6 already enjoying some of those health benefits, out of those
7 I already estimated. And we're enjoying them not only in
8 the year 2013, but in 2008, 2009 we're -- in between now and
9 then, they are already real.

10 Q. Indeed you heard the testimony too that the scrubber at
11 the Bull Run plant in eastern Tennessee is virtually
12 complete and will start up this year. And that next year
13 sulfur dioxide emissions will be even lower, correct?

14 A. That is correct. That means that the emission
15 reductions that the state is seeking are occurring earlier.
16 So the health benefits from that portion of the emission
17 reductions is starting earlier, and we enjoy them longer.

18 Q. In your cost-benefit analysis, you compared the total
19 costs to TVA, of installing the pollution controls
20 identified by Dr. Staudt, to the total value of the benefits
21 you calculated, correct?

22 A. That is correct.

23 Q. You did not disaggregate your analysis on a
24 project-by-project basis, did you?

25 A. I did not. Nor by air quality impact by air quality.

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1 No disaggregation on that side.

2 MR. LANCASTER: May I approach the map briefly,
3 Your Honor?

4 THE COURT: Yes.

5 Q. (Mr. Lancaster) As an example, Dr. Staudt identified
6 the Shawnee plant, way up here in western Kentucky, as a
7 plant that needs to have a scrubber to reduce sulfur dioxide
8 emissions, correct?

9 A. Yes.

10 Q. And you didn't perform a cost-benefit analysis,
11 comparing the costs of changing Shawnee, which already uses
12 low sulfur coal, to a scrub plant, you didn't prepare an
13 analysis of the costs of that action, to the benefits that
14 would accrue as a result of that specific action in North
15 Carolina, did you?

16 A. You are correct. I did not do any of the analyses
17 of -- you know, speculative analysis of what if this plant
18 only, or that plant, or any redistribution of how the
19 emission cap the state is seeking, might be distributed,
20 either one.

21 Q. I didn't ask you about speculative analysis. What I
22 wanted to confirm is, you don't have an opinion about
23 whether scrubbing the Shawnee plant, would be cost-benefit
24 justified, compared to the benefits to be obtained in North
25 Carolina, by scrubbing that plant in western Kentucky, did

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1 you?

2 A. I did no analysis of that, so I have no opinion of
3 that, yes, sir.

4 Q. Thank you. Now you acknowledge, do you not, that
5 uncertainty is inherent in the analytical task of estimating
6 the health benefits of improvements in air quality, and
7 further estimating the economic value of those health
8 effects, correct?

9 A. Yes.

10 Q. In fact, there's uncertainty in every step of the chain
11 of analysis involved, correct?

12 A. Yes.

13 Q. For example, one type of uncertainty that may affect
14 the health-benefits analysis, is an error in future
15 projections, correct?

16 A. I'm sorry. I didn't hear the words, I apologize.

17 Q. One type of uncertainty that may affect the
18 health-benefits analysis, is an error in future projections,
19 correct?

20 A. There are assumptions of future projections built in,
21 so if those changed upwards, for instance, larger emissions,
22 that would influence what I've done. So yes. As those
23 change, the benefits would change.

24 Q. And if they change in the other direction, if it turns
25 out that Dr. Staudt is wrong, has overestimated the future

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1 emissions, it would go in the other direction, wouldn't it?

2 A. Yes it would.

3 Q. There's also uncertainty about Dr. Staudt's cost
4 estimates, correct?

5 A. I have heard testimony to that, plus in what was
6 presented me, there were alternative cost estimates that's
7 reflection of his uncertainty right there.

8 Q. He originally gave you \$3 billion cost estimate, and
9 that is what you used to perform a cost-benefit analysis,
10 correct?

11 A. I did a cost-benefit analysis on three different cost
12 estimates I received from Dr. Staudt. The original one I
13 believe was the \$3 billion capital cost and two more.

14 Q. You received them one at a time, didn't you?

15 A. Yes, indeed.

16 Q. You received the \$3 billion estimate originally,
17 correct?

18 A. That's correct.

19 Q. And it had a uncertainty range of minus 50 percent to
20 plus 100 percent, correct?

21 A. No comment. I don't know if that's a factual statement
22 or not.

23 Q. So Dr. Staudt didn't tell you that his original
24 \$3 billion estimate had an uncertainty range of up to plus
25 100 percent?

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1 A. I received Dr. Staudt's report, and I do not recall at
2 this time what was in Dr. Staudt's report. I have no
3 recollection on whether that was in his report that I
4 received or not.

5 Q. In addition to cost, there's uncertainty in estimating
6 the premature mortalities allegedly caused by exposure to
7 PM2.5 and ozone, correct?

8 A. Uncertainty on the health estimation; is that your
9 question?

10 Q. Yes.

11 A. Yes. There is, as Dr. Levy discussed this morning.

12 Q. In terms of premature mortality, the benefit that you
13 calculated for premature mortality, is about 97 percent of
14 the quantified benefit that you calculated in North
15 Carolina, correct?

16 A. Yes it is.

17 Q. That means the adult mortality unit value that you
18 used, the VSL number, is the most important unit value in
19 your analysis, as it accounts for the vast majority of the
20 monetary benefits, correct?

21 A. Yes. That is what I testified to earlier.

22 Q. And you chose a VSL of \$7.25 million, correct?

23 A. An original VSL, the adult VSL is lower than that
24 because of the time lag discounted.

25 Q. The 2006 dollar value of \$7.25 million, correct?

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1 A. Is the original VSL which is used for infants. The
2 adult VSL is effectively lower, because of the assumption of
3 when this year emissions may effect themselves in adult at
4 6.7 million -- it's on my exhibit.

5 Q. I apologize. But given the value that you chose, there
6 is of course uncertainty associated with the VSL that you
7 used, correct?

8 A. Yes, there is.

9 Q. And there's a large and constantly growing amount of
10 economic research about valuing health risks, correct?

11 A. Yes, there is.

12 Q. And you mentioned that the range of values for the
13 value of a statistical life runs from 1 million to
14 \$10 million, correct?

15 A. That is OMB's specification, and that is what EPA uses.

16 Q. In selecting a single value out of that 1 million to
17 \$10 million range requires weighing a large number of
18 issues, doesn't it?

19 A. Yes, it does.

20 Q. And there is no definitive, consensus view among
21 economists, of the one best number to use to value premature
22 mortality, is there?

23 A. EPA's current method of using that 1 to \$10 million,
24 their analytical assumptions are that, that is -- that are
25 the determinist of the normally distributed range of values,

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1 where the lower fifth percent confidence interval is at
2 1 million. Where the 95th percent confidence interval is at
3 10 million. That means the 50th percent confidence interval
4 is at 5.5 million, on a normally distributed process.

5 That is the peer reviewed method. And so I believe
6 that that distribution of that range, does reflect the
7 current mainstream consensus opinion of VSL, with its range
8 and its mean value.

9 Q. You're not telling me that all economists agree on
10 that, are you?

11 A. I -- you can get three opinions out of any two
12 economists on anything in the world. I certainly do not
13 mean to imply they all agree.

14 Q. All right. So there is uncertainty at every step of
15 the chain of the analysis involved, both in the input
16 information that you received, and in the -- in your own
17 analysis, correct?

18 A. Correct.

19 Q. But you conducted no quantitative sensitivity analysis
20 or uncertainty analysis, did you?

21 A. I did not, for reasons I've discussed.

22 MR. LANCASTER: I have no further questions.

23 MR. GOODSTEIN: Just very briefly, Redirect, Your
24 Honor.

25 THE COURT: All right.

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1 REDIRECT EXAMINATION BY MR. GOODSTEIN:

2 Q. All right. Dr. Deck, you've been involved in a lot of
3 these economic analyses of air quality control programs; is
4 that right?

5 A. Yes, sir.

6 Q. In fact, your 20 plus years of experience has been
7 spent doing that same type of analysis, correct?

8 A. Yes.

9 Q. Overall, how would you characterize the scientific
10 rigor used by North Carolina's experts in this case?

11 A. The analytical rigor of the analysis, the air quality
12 analysis, the health analysis, the valuation analysis that I
13 have done, is truly reflective of the state of the applied
14 art circa 2006, certainly, when the analysis was done, and
15 no real change in that. They were the high end air quality
16 models, the highest end health estimation and valuation
17 procedure. This is --

18 Q. When you say high end, do you mean accuracy and
19 precision?

20 A. I'm sorry. State of the art. There are -- there's a
21 lot of compromise ways, this is the high end way, this is
22 the state of the art way to do it.

23 Q. In your experience, Dr. Deck, does uncertainty work
24 both ways?

25 A. Yes indeed. Almost all uncertainty is symmetric. Just

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1 as likely to be higher than lower, given our state of
2 knowledge of each component of it.

3 Q. And based on your understanding and your hearing of the
4 testimony earlier in the week about costs, is it your
5 understanding that the \$5 billion capital cost estimate that
6 you used in your analysis as one of your cost scenarios, is
7 TVA's own number for capital costs, for the pollution
8 controls sought by North Carolina in this case?

9 A. That is how it was presented to me. Yes, that's my
10 understanding of the source.

11 Q. And do you recall Dr. Staudt's testimony that that was
12 an upper bound in his opinion?

13 A. Yes. And that is, hence, my understanding was the
14 source of the, so called Staudt supplement derived from
15 Scott and Nash reflecting his opinions of their -- and
16 adjusting their cost estimates upward to reflect some of the
17 points they raised.

18 Q. How would you describe the benefit-cost ratio that you
19 derived, using the \$5 million number from TVA's experts for
20 capital costs? Is it still --

21 A. In the aggregate across all states, it still passes by
22 a 13 to 1 ratio, or 15 to 1 using the 2013 population.

23 As you go state by state, you can do the analysis.

24 For North Carolina alone, 2013, it passes it.

25 Certainly I've heard discussion of interest in the four

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1 state region, that would pass it by approximately a 5 to 1
2 margin in just those four states.

3 That's back -- that's lunch time back of the envelope.
4 You have all the information to do a benefit-cost ratio on
5 whatever subset of the states you want.

6 Q. Okay. And referring your attention to Plaintiff's
7 Exhibit 387 for Identification.

8 A. I'm sorry. Number again, please?

9 Q. 387.

10 A. Thank you.

11 Q. Can you tell us in the very states where TVA's plants
12 are located, what is your estimate of the current impacts of
13 TVA's excess emissions on health effects in those states?

14 A. To the extent that the future emissions -- excess
15 emissions are comparable, than in North Carolina, using the
16 2013 population as on the exhibit you asked me for, there is
17 791, rounded \$792 million benefits in North Carolina.

18 Q. What about Tennessee, Kentucky and Alabama?

19 A. Tennessee is \$1.368 billion.

20 Alabama; yes?

21 Q. Yes.

22 A. \$586.7 million.

23 Q. And Kentucky.

24 A. Thank you. \$693 million.

25 MR. GOODSTEIN: No further questions, Your Honor.

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SOMMERVILLE-DIRECT

1 MR. LANCASTER: Nothing further, Your Honor.

2 THE COURT: All right. Thank you. That will
3 complete your testimony and you may be excused Dr. Deck.

4 We'll take our 15-minute mid afternoon break.

5 (Recess.)

6 THE COURT: All right. Call your next witness,
7 Mr. Gulick.

8 MR. GULICK: Your Honor, thank you. If I may, we
9 have three more witnesses for this afternoon. They should
10 be a good bit shorter. I hope we'll get through them all.
11 It's hard to calculate exactly how much time, Your Honor,
12 but I believe we can get through them all.

13 THE COURT: That will be fine.

14 MR. GULICK: I may miss by a little bit on the
15 short side, I hope.

16 THE COURT: Hope. All right.

17 MR. GULICK: For the court reporter's benefit, I
18 switched seats. I'm Jim Gulick, and I'll be questioning all
19 three of these witnesses.

20 THE COURT: Okay.

21 MR. GULICK: Your Honor, we call as our next
22 witness Morgan Sommerville. Morgan.

23 THEREUPON, MORGAN SOMMERVILLE, being first duly sworn,
24 testified as follows during DIRECT EXAMINATION BY MR.

25 GULICK:

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1 MR. GULICK: Your Honor, if I might approach the
2 witness just to show him how to touch the screen.

3 THE COURT: Yes. That will be fine.

4 Q. (Mr. Gulick) Would you state your full name, please.

5 A. Charles Morgan Sommerville.

6 Q. Where do you live, Mr. Sommerville?

7 A. I live north of Asheville, in the Reeds Creek Valley.

8 Q. How long have you lived there?

9 A. About 30 years.

10 Q. What is your occupation?

11 A. I'm the regional director for the Appalachian Trail
12 Conservancy.

13 Q. And I take it that's related to the Appalachian
14 National Scenic Trail in some way?

15 A. It is, yes. The Appalachian Trail Conservancy is in
16 charge of looking after and protecting the Appalachian
17 National Scenic Trail.

18 Q. Tell us a little bit about what the Appalachian
19 National Scenic Trail is?

20 A. The Appalachian Trail is a primitive foot path that
21 runs 2,175 miles along the crest of the Appalachian
22 Mountains from Springer Mountain in Georgia, to Katahdin,
23 which is the highest point in Maine.

24 It's -- it was conceived of in 1921 by Benton MacKaye.
25 Construction started in 1923. It was initially completed in

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1 1937. And in 1968 Congress designated the Appalachian Trail
2 as first National Scenic Trail.

3 Q. Is it a unit of the National Park Service?

4 A. Yes it is.

5 Q. Tell us a little bit about your background. What is
6 your educational background, higher education?

7 A. I have a degree in conservation from North Carolina
8 State University.

9 Q. And what year was that?

10 A. 1974.

11 Q. And how long have you been employed by the Appalachian
12 Trail Conservancy?

13 A. More than 25 years.

14 Q. Tell us a little bit about what the Appalachian Trail
15 Conservancy is?

16 A. The Appalachian Trail Conservancy is a private,
17 nonprofit national organization. It has about 42,000
18 individual members. It's also a federation of 30
19 Appalachian Trail maintaining clubs, which have a combined
20 membership of approximately 100,000.

21 The Appalachian Trail is the only state, federal or
22 private organization that has oversight for management of
23 every foot of the Appalachian Trail. And we facilitate the
24 management of the volunteers who do most of the trail
25 maintenance and management.

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1 Q. Does the Appalachian Trail Conservancy actually have a
2 formal relationship with the National Appalachian Scenic
3 Trail?

4 A. Yes. We have a series of memorandum of understanding
5 and so on with the National Park Service, the U.S. Forest
6 Service. But probably most importantly the Department of
7 the Interior in 1984 delegated management of the Appalachian
8 Trail to the Appalachian Trail Conservatory.

9 Q. And I think you said what your particular role was.
10 What is your job again?

11 A. I'm the Regional Director. My area that I work in is
12 Georgia, North Carolina, and Tennessee.

13 Q. And what is your responsibility in that?

14 A. Well, as a unit of the National Park, the Appalachian
15 Trail has to be managed just like any National Park. My job
16 is to manage all the dispart things that go on in the
17 National Park, maintenance, visitor management, resource
18 management.

19 I have a staff of four people and number of seasonals
20 that work in our region. And we work very closely with the
21 five most southern AT clubs that manage the trail.

22 Q. I would like you to come down if you would with the
23 court's permission you will see on the easel, the one
24 closest to me is a map. See if you can identify that
25 portion of the Appalachian Trail on the map which is part of

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1 the area that you have management responsibility for.

2 A. Well, all of it in Georgia, North Carolina and
3 Tennessee. Would you like me to get up and point to it?

4 Q. With the Judge's permission.

5 THE COURT: Yes. You may step down and show us
6 that area, Mr. Sommerville.

7 THE WITNESS: This would be the southern terminus
8 in Georgia, Springer Mountain. Runs up here into the
9 southern Nantahala wilderness around Franklin, North
10 Carolina. Goes north to TVA territory called the Fontana
11 Dam. Enters Great Smoky Mountains National Park, and that's
12 the first place that gets on the Tennessee/North Carolina
13 state line. It follows -- pretty much follows the
14 Tennessee/North Carolina state line up through here.
15 Asheville's down here of course, Erwin, Tennessee. On over
16 to the Roan Highlands, where the trail then goes into
17 Tennessee for the rest of my territory up to Damascus,
18 Virginia.

19 Q. Mr. Sommerville do, in doing your work, do you rely on
20 volunteers?

21 A. Yes. We are very fortunate to have about 6,000
22 volunteers who contribute about 200,000 hours a year toward
23 the stewardship of the Appalachian Trail.

24 Q. Is that in your territory?

25 A. No, that's trail wide.

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1 Q. Trail wide?

2 A. Yes.

3 Q. In your territory, are there groups that you draw
4 volunteers from?

5 A. We have five local AT clubs that we work with,
6 Tennessee Hiking Club in Kingsport, Carolina Mountain Club
7 in the Asheville area, Nantahala Hiking Club in the Franklin
8 area, Smoky Mountains Hiking Club based in Knoxville
9 Tennessee. And the Georgia AT Club that is in north
10 Georgia.

11 We also recruit volunteers from all over the country
12 and all over the world for Appalachian Trail projects. We
13 have a lot of people interested in the trail.

14 Q. I was wondering if you could tell us if you are
15 familiar with a document called the Appalachian Trail Vital
16 Signs document?

17 A. Yes I am. It was published in 2005 by the AT Park
18 Office, which is the National Park Service entity that
19 administers the Appalachian Scenic Trail.

20 Q. Is that a document that you use in the course of your
21 work?

22 A. We use it for a number of reasons. It's a resource
23 document that we refer to when needed.

24 (Plaintiff's Exhibit Number 276 was marked for
25 identification.)

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1 Q. I would like to draw your attention to Plaintiff's
2 Exhibit Number 276.

3 You will see a page in front of you. I would like to
4 ask you if you recognize what that document is?

5 A. That is the Appalachian Trail Vital Signs Report.

6 MR. GULICK: And Your Honor, this is a document
7 which we have a certified copy.

8 THE COURT: 276?

9 MR. GULICK: Yes, Your Honor.

10 THE COURT: Yes I have it before me. Thank you.

11 MR. GULICK: Just want to draw to the court's
12 attention that we have a declaration by an employee of the
13 United States Park Service as records manager who --
14 authenticating a copy of this document which I would like to
15 hand up at some -- either now or at the end of this
16 testimony.

17 THE COURT: All right.

18 Q. (Mr. Gulick) I would draw your attention, if you would,
19 this will be to page 12 of this document. That's page 12
20 electronically -- I'm sorry. Bear with me a moment. I'm
21 confused between the electronic copy and the document.

22 I'm sorry. It is page 12 should show the bottom
23 of the page 2346.

24 A. All right.

25 Q. And I would like to draw your attention if you would,

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1 to the left hand column of this, which is now shown on
2 the -- should be shown on the screen as well, Your Honor.

3 Does this contain a definition, Mr. Sommerville, of
4 what the vital signs are for the Appalachian Scenic Trail?

5 A. Yes.

6 Q. And is it shown -- what's shown there in italics in the
7 left hand column?

8 A. Yes.

9 Q. And in your words, what are those vital signs?

10 A. The vitals signs are a series of issues and resources
11 that the National Park Service uses to serve as a foundation
12 for environmental monitoring of the trail so that they can
13 protect Appalachian Trail resources unimpaired for future
14 generations.

15 MR. GULICK: I would like to draw your attention
16 to the hard copy document, Your Honor, Bates stamp page
17 number 2351. And the electronic copy, I guess I believe
18 should be page 17.

19 And are you familiar with this chapter?

20 A. Yes. This is the chapter on ozone.

21 Q. And in this chapter I would like to draw your attention
22 to the left hand column, the first few sentences of the
23 second paragraph.

24 A. Yes.

25 Q. I would just like you to read these -- is ozone one of

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1 the vital signs that the park is concerned with?

2 A. It is.

3 Q. And why is that?

4 A. Well, as it points out here, a high ozone
5 concentrations cause respiratory problems in humans, and are
6 a particular threat to people who are engaging in strenuous
7 aerobic activity such as hiking. Of course the Appalachian
8 Trail is a hiking trail.

9 Q. And could you read just for the -- while you're there,
10 just read the next sentence.

11 A. "High ozone levels can be dangerous for people with
12 respiratory problems like asthma, and can even temporarily
13 reduce lung functions in healthy individuals."

14 Q. I take it you've hiked a great deal yourself on the
15 Appalachian Trail?

16 A. I've hiked all of it.

17 Q. Have you yourself ever had difficulty with respiratory
18 problems on the Appalachian Scenic Trail?

19 A. Back five or six years ago, I took a hike from
20 Clingmans Dome -- excuse me, from Newfound Gap in the
21 Smokies, north on the trail to Hex Corner and then
22 Tri-Corner Knob over the course of two days and back again.

23 And when I was leaving, started experiencing burning
24 sensation in my chest. I didn't take note at the moment --
25 didn't register to me what that might be, but after I got

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1 off the trail I was told by others that the -- it was a high
2 ozone day for a period of time.

3 Q. As a result of issues such as high ozone days, do you
4 have to manage your volunteers with an eye towards that
5 concern?

6 A. Yes. We have in the Smokies, two volunteer trail
7 crews, and Smoky Mountain Hiking Club also has many
8 volunteers who work in the park on the Appalachian Trail.
9 And we also have seasonal employees called Ridgerunners who
10 control the trail back and forth to help with visitor
11 education.

12 We have protocol in place that if there is a high ozone
13 alert day, then the volunteers or employees know that
14 they're supposed to curtail physical activities or get off
15 the trail, if they can, to avoid health consequences from
16 this.

17 Q. Now, when you came in the courtroom earlier today, did
18 you hand a document to me that you had received today for
19 the first time?

20 A. Yes. I'm on a e-mail list for Great Smoky Mountains
21 National Park. They send out periodic press releases. And
22 I received one this morning saying that today was the first
23 ozone alert day of the summer.

24 So our protocol should go in place. We have our sweat
25 crew working this week, and also our Ridgerunners are

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1 working. So they listen to the morning report that the Park
2 Service broadcasts to see if there are any concerns for the
3 day. And they should have gotten that report and should
4 have curtailed their activities.

5 MR. GULICK: Your Honor, may I approach the
6 witness?

7 THE COURT: Yes.

8 (Plaintiff's Exhibit Number 487 was marked for
9 identification.)

10 Q. (Mr. Gulick) Mr. Sommerville, I'm handing you a
11 document that I've marked as Plaintiff's Exhibit 487 and ask
12 you if that's the document that you handed to me earlier
13 today?

14 A. Yes, it is. It's the first ozone advisory this year
15 from the Smoky Mountains National Park.

16 Q. I'm sorry. I was moving around too much. You
17 indicated this was the first ozone advisory that you
18 received?

19 A. Right. That's detailed somewhere down in the body of
20 this. I guess there have been other days when the ozone was
21 high, but due to timing of the day, they didn't issue an
22 alert. But today, it occurred early in the day, and they
23 were concerned about visitor health.

24 Q. Could I draw your attention to the second paragraph?

25 A. Yes.

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1 Q. And it's just two sentences, and just a short
2 paragraph. Could you read that?

3 A. "Under federal and state human health standards in
4 Tennessee and North Carolina, an 8-hour average ozone
5 concentration of 76 parts per billion or greater is
6 considered unhealthy for certain people.

7 At 9 a.m, 8-hour average ozone levels in the park
8 ranged from 87 parts per billion at Clingmans Dome, to 77
9 parts per billion at Lid Rock."

10 Q. Thank you. In addition to health concerns with regard
11 to the trail, are you aware of whether there are other
12 issues with respect to ozone, involving the Appalachian
13 Trail, non-health issues?

14 A. Well, it affects vegetation along the trail.

15 Q. And does the -- like to draw your attention to the next
16 page, page 18 electronic, in the vital signs document.

17 Which Your Honor is page -- the Bates number is 2352 at
18 the bottom of the page, Your Honor.

19 There are two photographs shown at the bottom of the
20 figure 1.3 and figure 1.4. And I wanted to ask you,
21 Mr. Sommerville, have you seen this kind of injury on leaves
22 in the park in the Appalachian Trail?

23 A. Yes I have it's -- yes.

24 Q. And these indicate, these two figures indicate that
25 this is sign of ozone injury, do they not?

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1 A. Yes. These are ozone created, sort of black areas on
2 the leaves.

3 Q. I would like to draw your attention to page 2353, very
4 briefly. And simply ask what this table represents?

5 A. This is a list of ozone sensitive species on or near
6 the Appalachian Scenic Trail. These are ones that would
7 typically exhibit those discolorations.

8 Q. And Mr. Sommerville, are you aware of what one of the
9 principal reasons -- what is the principal reason people
10 visit the Appalachian National Scenic Trail?

11 A. It is a national scenic trail. Scenery and good views
12 are fundamental to that. That's why Congress designated it.
13 And that's why visitor use survey shows that's the main
14 reason people are out there, is the views from the trail.

15 Q. I would like to draw your attention to further on in
16 this vital signs document, the Bates number page, Your
17 Honor, would be 2357. And the electronic page number, I
18 believe, is 23.

19 Are you familiar with this chapter in general matters,
20 Mr. Sommerville?

21 A. Yes. This is the chapter on visibility.

22 Q. Have you yourself witnessed issues on the trail
23 regarding visibility?

24 A. Yes. On numerous occasions the haze is often an issue
25 in the Smokies. We have a number of programs in the

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1 Smokies, so over the years I've spent a fair amount of time
2 there.

3 There are also a number of significant famous
4 viewpoints along the trail in the Smokies such as Clingmans
5 Dome or Charlie's Bunyan, Silers Bald and so on. So those
6 are favorite places for people to go look at the view.

7 Q. What effect does haze have on the views?

8 A. It can be very significant. We have a -- we developed
9 a display for the Sugarlands Visitors Center in the Great
10 Smoky Mountains National Park.

11 And the Park Service always requires that all their
12 displays show some of the threats to the park. One of the
13 ones we chose that was most significant was the visibility
14 threat.

15 Visibility in the Smokies on a good day ought to be
16 around 80 miles, and can get down to as little as 15 or less
17 because of haze.

18 Q. Now in your experience is haze the same thing as mist?

19 A. No. It's pretty obviously different. The haze is
20 usually sort of reddish-orange. It can be -- you can look
21 up and see blue sky. Then you look out to the view and see
22 kind of a reddish haze that gets thicker as you look down
23 from higher viewpoints.

24 Its common, unfortunately. And after a front goes
25 through, hikers will often rush to get to the good viewpoint

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1 to try and get a good view before the haze comes in. If you
2 stay there for an hour or so, you can physically watch it
3 come back.

4 Q. I would like to draw your attention to the following
5 page, Bates number 2358. On the top of the page should be a
6 bar chart, Mr. Sommerville. Are you familiar with this bar
7 chart?

8 A. Yes. I've seen it before.

9 Q. Do you understand what it shows?

10 A. Well, it shows the amount of haze at various points
11 along the Appalachian Trail.

12 Q. And you've indicated that your portion of the
13 Appalachian Scenic Trail that you're responsible for runs
14 through the Great Smoky Mountain National Park?

15 A. Right.

16 Q. If you would, could you identify, you can touch your
17 screen. If you can identify where that's located on this
18 particular bar chart?

19 A. It's the third or the fourth bar from the left. And of
20 course it's one of the haziest places.

21 Q. Does this reflect your portion of the trail or it's a
22 lot of different places actually?

23 A. I'm sorry?

24 Q. I'm sorry. I was a little bit inarticulate there.

25 What do the differences between the red and the gray

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1 mean, do you know?

2 A. I don't recall what the difference is.

3 Q. Just refresh your memory at the bottom there's a little
4 line regarding the figure.

5 A. Red bars indicate the sites near the Appalachian Trail.

6 Of course the -- there are some air quality testing
7 sites in the Great Smoky Mountains National Park, just
8 100 feet or so off the Appalachian Trail at Clingmans Dome.

9 Q. Thank you. Mr. Sommerville, you indicated scenery and
10 view of the scenery was one of the most important parts of
11 the trail experience --

12 A. That's correct.

13 Q. I forget quite how you put it.

14 Are you familiar -- are you familiar with a document
15 that's called, "Use and Users of the Appalachian Trail, a
16 source book"?

17 A. Yes. That's a visitor's survey that was conducted
18 about five or six years ago, and gets opinions from hikers
19 trail wide, about what they like about the trail, so on.

20 Q. Is that a document that you use?

21 A. Yes. We use -- consult it. It's always interesting to
22 see what people are thinking about the trail.

23 (Plaintiff's Exhibit Number 275 was marked for
24 identification.)

25 Q. I would like to draw your attention to Exhibit 275.

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1 You can erase that yellow. That's good.

2 Do you know what Exhibit number 275 is?

3 A. Yes. This is the cover page for the User Survey.

4 MR. GULICK: Your Honor, this Exhibit 275 is an
5 excerpt of this document. We did -- and that's because that
6 excerpt is all that we wish to be involved with here.

7 But I did want to inform the Court and the
8 Defendants, that we have the entire document, if necessary.
9 It's several inches thick. Which has been authenticated by
10 the -- once again, by the National Park Service.

11 And I can put the entire document into evidence if
12 the Defendants wish?

13 MS. COOPER: Your Honor, I have an objection to
14 this document. Not on authenticity grounds, but on hearsay
15 grounds.

16 It says that it is a compilation of data from a
17 comprehensive users survey conducted in 1999. This effort
18 was lead by researchers from the University of Vermont, in
19 partnership with the Pennsylvania State University. And
20 carried out with the detailed assistance of club volunteers
21 and seasonal staff.

22 So I don't believe that it can be used as a public
23 record of the Park Service. And there's no basis for
24 concluding, based on what counsel for Plaintiff has said,
25 that it is a business record of the University of Vermont or

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1 Penn State University.

2 So I don't think we've established it's
3 admissibility yet.

4 MR. GULICK: Your Honor, I have in my hand, an
5 affidavit from a member of the United States National Park
6 Service, which I would be happy to hand up for you to see if
7 you would like to review it, and determine whether this is
8 an admissible document.

9 THE COURT: Let me see the affidavit.

10 MR. GULICK: Do you want the whole document?

11 THE COURT: No.

12 MR. GULICK: May I let Defendant see it first?

13 THE COURT: Yes. Let counsel see it first.

14 275, is it part of this source book for which this
15 affidavit is made?

16 MR. GULICK: Yes, Your Honor. And I actually have
17 the entire document.

18 THE COURT: Then I'll accept this as an
19 authentication of the book of which this is a part.

20 And if there's an objection to the part, I'll
21 admit the whole book. I assume it includes this.

22 Counsel tells me this is from the source book,
23 which has been authenticated by this affidavit, as a part of
24 the official records of the National Park Service.

25 So does the objection go to its just being a part

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1 or to the admissibility?

2 MS. COOPER: Your Honor, the objection goes to its
3 hearsay nature, not to its completeness.

4 THE COURT: Not being complete?

5 MS. COOPER: No. To the fact that it's hearsay,
6 Your Honor.

7 THE COURT: Oh, it goes to hearsay.

8 MS. COOPER: Yes.

9 THE COURT: All right. The objection's overruled.

10 Q. (Mr. Gulick) I would like to -- Mr. Morgan, I would
11 like to draw your attention to Bate stamp number page
12 394229. And Your Honor, I believe it should be page 70 of
13 the electronic document.

14 Mr. Sommerville, are you familiar with this page?

15 A. Yes. It lists various activities that Appalachian
16 Trail users might participate in. And then the participants
17 in the survey express which ones they are most interested
18 in.

19 Q. And in the bullet points at the bottom, is there a
20 bullet point that relates to the value -- excuse me, not the
21 value, to view and scenery?

22 A. Says, "View and scenery was the most frequently
23 reported activity, 81.9 percent for overall users."

24 Q. And I would like now to draw your attention to the
25 following page of the exhibit which is actually page 18 of

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1 the document itself, Bates page 394230?

2 THE COURT: What's the page again?

3 MR. GULICK: I apologize, Your Honor.

4 THE COURT: What's the page again?

5 MR. GULICK: It's -- there are two page numbers on
6 the hard document there right in the middle of the bottom,
7 that's 18. And Bate stamp 394230. Should be the next page
8 from the one -- after the one we were just talking about.

9 THE COURT: Okay. Now I have it. Go ahead.

10 MR. GULICK: Thank you, Your Honor.

11 Q. Mr. Sommerville, I want to draw your attention to
12 the -- there are two sort of charts here or tables, if you
13 will. I would like to draw your attention to the top one.
14 And in general, are you familiar with this?

15 A. Yes.

16 Q. It seems to talk about different types of hikers.
17 Could you explain that a little bit?

18 A. Day hiking people who go out for a day. Backpackers
19 who are spending at least one night out. Camping, might
20 include car campers. You got view and scenery, picnicking,
21 horseback riding, hunting, fishing, so on.

22 Q. I see. I meant at the top there is a list of types of
23 users, day user?

24 A. Right. Day users, overnight users, section hikers are
25 people hiking a week or so on the trail. And through hikers

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1 are people attempting to hike the whole trail at once.

2 Q. The whole 2,000 miles?

3 A. Right.

4 Q. I want to just draw your attention on this to, there's
5 a line that has view and scenery that you just mentioned,
6 which is the fourth line down, and just go all the way
7 across.

8 And if you would, could you -- does this show the --

9 A. This shows that view and scenery was the most important
10 reason people are out there, you know, on average.

11 Q. All of those are in the 80 percent category, all the
12 way, all types of users?

13 A. Right.

14 Q. And I would like to draw your attention then to the
15 panel below there to the table below and again what does
16 this show?

17 A. This shows the listing of the same types of activities
18 people might participate in. But then groups the results by
19 region, New England, Mid Atlantic, south west, deep south,
20 which is the region I work in. And then also breaks out
21 thru hikers.

22 Q. What does this reflect, Mr. Sommerville, about the
23 viewing scenery in deep south, your region?

24 A. Again, shows the favorite thing people are out there
25 for. Shows it through every region including thru hikers.

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1 Q. In your experience, Mr. Sommerville, does poor
2 visibility interfere with viewing scenery?

3 A. It most certainly does. And if you talk to people who
4 hike, have given a piece of the trail as hazy, versus after
5 a front goes through, you will get totally different takes
6 on what the view was like. People with good views are --
7 give good reports, and people who see it when it's hazy,
8 want to come back and see it when it's in good shape.

9 MR. GULICK: I have no further questions of this
10 witness.

11 THE COURT: All right. Questions?

12 MS. COOPER: We have no questions, Your Honor.

13 THE COURT: Thank you.

14 MR. GULICK: Your Honor, before -- I do wish to
15 move into evidence exhibits 276, 275, and 487 which we
16 handed up to the clerk.

17 THE COURT: All right. 276, 487 and 275.

18 MR. GULICK: Yes, Your Honor.

19 THE COURT: All right. Those will be received.
20 (Plaintiff's Exhibit Number 275, 276, 487 having been
21 marked, was received in evidence.)

22 MR. GULICK: Would Your Honor like the entire
23 authenticated document in the record?

24 THE COURT: I guess we might as well.

25 All right. Call your next witness.

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1 MR. GULICK: I will. Your Honor, thank you.

2 I also was going to hand up this actual certified
3 copy of the -- of this report as well, which you reviewed
4 which --

5 THE COURT: Which exhibit is that?

6 MR. GULICK: This would be 276, Your Honor.

7 THE COURT: And you put the entire document as
8 certified?

9 MR. GULICK: Yes. Containing an affidavit of
10 authenticity.

11 THE COURT: All right. Let it be admitted as 276
12 then. Let it be admitted with the certification of
13 authenticity. As we have just admitted 275 with its
14 certificate of authentication.

15 MR. GULICK: Your Honor, our next witness is Leah
16 Mathews.

17 THEREUPON, LEAH MATHEWS, being first duly sworn, testified
18 as follows during DIRECT EXAMINATION BY MR. GULICK:

19 Q. Good afternoon. Please state your full name.

20 A. Leah Greden Mathews.

21 Q. Where do you live?

22 A. I live in Candler, North Carolina.

23 Q. Where are you employed?

24 A. I work at the University of North Carolina at
25 Asheville.

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1 Q. And how long have you worked at the University of North
2 Carolina Asheville?

3 A. I just completed my eleventh year there.

4 Q. What is your job title?

5 A. Associate Professor of Economics.

6 (Plaintiff's Exhibit Number 439 was marked for
7 identification.)

8 Q. (Mr. Gulick) I would like to show you what has been
9 marked for identification as Plaintiff's Exhibit 439. And
10 Dr. Mathews, it will appear on your screen.

11 Your Honor, this is Plaintiff's Exhibit 439.

12 And ask you Dr. Mathews if this is a true and
13 accurate copy of your curriculum vitae?

14 A. Yes.

15 Q. Dr. Mathews, I would like to ask a little bit about
16 your college and post-graduate education. Where did you get
17 your college degree?

18 A. My undergraduate degree is from Marquette University in
19 Milwaukee. And my Ph.D is from the University of Minnesota.

20 Q. And what did you get your Baccalaureate degree in?

21 A. I had three majors, French, International Affairs and
22 Economics.

23 THE COURT: I don't have your -- okay. Now we got
24 it.

25 MR. GULICK: I apologize, Your Honor. It's in a
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1 different book.

2 This should be Exhibit 439.

3 THE COURT: Right. I have it before me now.

4 MR. GULICK: I apologize, Your Honor.

5 Q. Dr. Mathews, you indicated you had a triple major?

6 A. As undergraduate, yes. In French, Economics and
7 International Affairs.

8 Q. Did you get a Masters Degree?

9 A. I did not get Masters Degree.

10 Q. But you did get a Ph.D?

11 A. Yes. From the University of Minnesota in 1998.

12 Q. What subject did your get Ph.D in?

13 A. My Ph.D. is in Agricultural and Applied Economics.

14 Q. Is that shown on your CV?

15 A. Yes it is.

16 Q. And did you engage in research while you were in
17 graduate school?

18 A. Yes.

19 Q. What kind of research did you do?

20 A. I started doing research with a professor on financing
21 farmland preservation. But as I moved closer to my
22 dissertation stage, I concentrated exclusively on nonmarket
23 valuation studies.

24 Q. Could you tell the Court what nonmarket valuation
25 studies are, what that means?

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1 A. Yes. Nonmarket valuation is an economic methodology
2 used to estimate the values or the prices of those things
3 that aren't commonly exchanged in markets like water
4 quality, scenic quality and visibility.

5 Q. And in what subject did you do your dissertation?

6 A. My dissertation was nonmarket valuation study, looking
7 at the benefits of improving water quality in the Minnesota
8 River.

9 Q. I will ask you if you can tell the Court, are there
10 different types of nonmarket valuation?

11 A. Yes. There are two general categories or methods that
12 fall under the umbrella of nonmarket valuation. Those two
13 methods are, revealed preference methods, and stated
14 preference methods.

15 Q. Would you explain a little bit about the difference
16 between those two?

17 A. Yes. The revealed preference methods are a direct
18 method -- or excuse me, are an indirect method that uses a
19 proxy market for getting at the values for those services
20 that you can't purchase directly.

21 For example, if I have a contaminated well, my value
22 for water quality may be exhibited by the price that I pay
23 for bottled water in my home.

24 On the flip side of the coin, the stated preference
25 methods are those that are direct, in that you ask people

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1 directly about their valuations for those services and goods
2 that they can't purchase, like scenic quality.

3 Q. And in the second of those two categories in the stated
4 preference, are there different subcategories of that?

5 A. Yes. Depending on the good or service that you're
6 attempting to value, there are at least three different
7 kinds of, or categories of methods that you can use under
8 that stated preference category.

9 Contingent valuation, where you ask people directly
10 about their willingness to pay for that good or service.

11 A second category is contingent behavior. If you're
12 interested in asking about whether or not they would behave
13 differently under different levels of that good or service.

14 A third type under that umbrella of stated preference
15 category is a tool called choice modeling, that asks
16 directly about various attributes for a particular good and
17 service.

18 And that would be useful if you are looking to get at
19 the composite value for a particular good.

20 Q. You indicated you got your Ph.D in what year, I forgot?

21 A. 1998.

22 Q. 1998. And when did you become employed at the
23 University North Carolina Asheville and in what capacity?

24 A. I actually started working at UNCA in 1997, about nine
25 months before I completed my dissertation. Because I had

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1 not completed my dissertation, I was appointed initially as
2 an instructor of economics. Upon completion of my
3 dissertation, the following year I was appointed as an
4 assistant professor.

5 Q. And are you still an assistant professor?

6 A. No. I received tenure and promotion in 2004. I'm now
7 an associate professor.

8 Q. What kinds of courses do you teach at Appalachian --
9 UNC Asheville. Excuse me, my apologies.

10 A. Yes. I teach several different courses, from
11 principles of microeconomics, to land economics, to
12 environmental economics and policy.

13 I also teach a natural resource economics course, and a
14 senior research seminar sequence in our department which has
15 two different courses that looks at both the methods that
16 researchers employ as economists.

17 And the second is actually assisting students with
18 undergraduate research.

19 Q. Do you yourself -- have you yourself conducted
20 research?

21 A. Yes.

22 Q. In what subjects?

23 A. In several subjects. My primary research has been
24 under the umbrella of nonmarket valuation. And several of
25 the studies have been done here in western North Carolina.

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1 Q. Let me ask you this, is nonmarket valuation an accepted
2 methodology in the economic field?

3 A. Yes it is. There are thousands of studies that have
4 been done, contingent valuation, and contingent behavior,
5 using all the methods, actually.

6 And increasingly, these are being used, and not only as
7 a basis for making every day decisions by individual
8 companies, but also by policymakers.

9 Q. And you actually yourself conducted nonmarket
10 valuations for purposes other than research? My question is
11 unclear, I'll restate it.

12 Have you yourself actually conducted nonmarket
13 valuations?

14 A. Yes.

15 Q. And could you tell us in general what kinds of
16 nonmarket valuations you have conducted?

17 A. Yes. In addition to the study I referred to earlier
18 that I did for my dissertation, I also have conducted a
19 study of visitors at Fontana Lake, looking at their benefits
20 that they would have from higher lake levels for their
21 recreational purposes.

22 I also have conducted studies on the Blue Ridge Parkway
23 where we estimated the benefits of scenic quality and
24 visibility to those visitors.

25 My current research is collecting, estimating and

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1 analyzing the nonmarket benefits associated with farmland in
2 a four county region here in western North Carolina.

3 MR. GULICK: Your Honor, at this time I would like
4 to qualify Dr. Mathews as an expert in applied environmental
5 economics, including nonmarket valuation. And a particular
6 subject here is a value of scenic views and visibility for
7 the Blue Ridge Parkway.

8 MS. GILLEN: Your Honor, TVA does not object to
9 Dr. Mathews' qualifications. We are aware of the previous
10 ruling on this topic. I just want to note for the record
11 that Dr. Mathews did not file an expert report in this case.

12 MR. GULICK: Your Honor, this witness was
13 identified in October of 2006 as a potential witness to
14 give -- potentially testify about value on visibility on the
15 Blue Ridge Parkway.

16 I will also state, although she was not engaged to
17 do any work for us in this case, just like Dr. Russell was
18 not, that actually she did a study that is reported --
19 excuse me. She did a study, and in fact that document was
20 produced to the Defendants in the very first round of
21 production that the state did.

22 In fact, I'm looking at the Bate stamp, we
23 produced several -- almost 400,000 pages of documents, Your
24 Honor, in response to their discovery requests. And the
25 first of these two documents begins with a Bate stamp number

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1 5821.

2 And it is about that subject, that report and its
3 companion report that I seek to question her about.

4 So that the Defendants have had ample notice, both
5 of Dr. Mathews as a potential witness, and actually the very
6 subject matter of the report I will question her about.

7 MS. GILLEN: I said that we are aware of the
8 previous ruling on this topic, Your Honor. I just wanted to
9 note it for the record that we have gotten copies of this
10 report. We are familiar with the two reports and are
11 prepared to cross examine her on them.

12 THE COURT: All right. The objection will be
13 overruled. And we will proceed with the cross by
14 stipulation that the Court accepts and finds the witness to
15 be an expert witness in the field as stipulated by the
16 parties.

17 MR. GULICK: Thank you, Your Honor.

18 Q. Dr. Mathews, I want to ask you about the study that you
19 worked on with respect to the Blue Ridge Parkway.

20 At first I would like you to explain to us what the
21 whole project was, before we get into the, what it came to
22 be and what the focus was.

23 A. The overall project was called the Blue Ridge Parkway
24 Scenic Experience Project.

25 As the title suggests, it was designed to help the park

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1 learn about the scenic experiences that their visitors have
2 in the park.

3 In particular, the park was interested in learning
4 about whether or not scenic quality changes along the
5 parkway would impact visitors experiences and in particular
6 if it would impact their future visitation to the park.

7 Q. Was there a team that you worked with on this project?

8 A. Yes. I had two co-investigators on the project. Both
9 were economists, Dr. Susan Cat who is currently at Warren
10 Wilson College. And Dr. Steven Stewart, who at the time of
11 the study was at UT at Knoxville. He is currently at
12 Arizona State University.

13 Q. And Dr. Mathews, was this project done in two phases?

14 A. Yes it was. Because the park was interested in
15 learning about their scenic quality, and the impact of those
16 changes on their visitors. And because the scenic quality
17 is different, in different parts of the park, we conducted
18 the study in two distinct phases.

19 The first phase was done in southwest Virginia. Which
20 is roughly from Roanoke to the North Carolina/Virginia state
21 line. That study was implemented in 2000.

22 The second phase of the Blue Ridge Parkway Scenic
23 Experience Project extended from the North Carolina/Virginia
24 state line south to Asheville. We refer to that as Phase
25 Two. And it covered the northern North Carolina section of

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1 the park.

2 Q. Were you the principal investigator -- I take it --
3 excuse me. Let me rephrase this question and actually might
4 ask another question.

5 Were you involved in both phases of this project?

6 A. Yes I was. I was involved as co-investigator in the
7 first phase, and principal investigator in the second phase.

8 Q. I would like now to show you what has been marked --
9 this will be in a different book, Your Honor. This will be
10 Plaintiff's Exhibit 281.

11 THE COURT: 281?

12 MR. GULICK: Yes. Different volume if you want to
13 have a hard copy in front of you.
14 (Plaintiff's Exhibit Number 281 was marked for
15 identification.)

16 THE COURT: All right.

17 Q. (Mr. Gulick) Dr. Mathews, you should have this on the
18 screen in front of you. And I would like to ask you what
19 this document is?

20 A. This document is a synthesis of both phases of the Blue
21 Ridge Parkway Scenic Experience Project.

22 In other words, it summarizes both Phase One And Phase
23 Two results.

24 Q. So this synthesizes both of these results? I would
25 like for you to -- you indicated one of the principal

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1 aspects of this was to evaluate the scenic quality. I would
2 like to you tell us what scenic quality is, and I think you
3 indicated there was also -- did you indicate there was also
4 a valuation of visibility?

5 A. Yes. In Phase Two of the study only, there was only a
6 valuation of visibility.

7 Q. So first I would like you to tell us about what scenic
8 quality is, and how you went about that valuation?

9 A. Well, scenic quality is quite simply, what you see, or
10 how well what you see, basically. And what is composed in a
11 view.

12 For example, if you're driving down the road and you're
13 looking at -- stopping at an overlook, what exactly are you
14 looking at? Are you looking at trees; are you looking at
15 houses; are you looking at cell towers?

16 Scenic quality is the measure of what it is that people
17 see.

18 To get at the valuation for that scenic quality, we
19 actually used several different methods. All different
20 nonmarket valuation methods.

21 One of them was a contingent valuation asking directly
22 visitors about their willingness to pay to preserve existing
23 scenic quality on the park. That was a contingent valuation
24 element of the study.

25 Q. I don't intend to go into detail about that, but during

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1 the course -- as you are planning this study, did you make a
2 decision to add an element of this study with respect to
3 visibility?

4 A. Yes. When we were implementing Phase One of the study
5 in southwest Virginia, we heard frequent comments from
6 visitors, not only about what they were seeing, but also how
7 well they could see it.

8 And it was during that implementation of the first
9 phase of the study that we determined it would be useful to
10 also add a willingness to pay question about visibility for
11 the second phase of the study.

12 Q. I would like you to tell us how you went about
13 conducting that visibility aspect is what we're interested
14 in.

15 Just describe for us what the situation was, in terms
16 of you conducted the study and how you went about conducting
17 the study?

18 A. Well, as you may know, the park does not keep a list of
19 its visitors. And so to implement the study, we needed to
20 go to the park and actually set up our survey implementation
21 on site where the visitors are.

22 So in both phases of the study, we were directly in the
23 park, in order to implement the study.

24 Q. Did that require the permission of the Park Service?

25 A. Yes of course.

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1 In addition to permission from the Park Service, we
2 were constrained by National Park policies about how to
3 approach visitors.

4 And in fact, we were not allowed to directly approach
5 any visitor, to compel any individual visitor to complete
6 our survey.

7 Q. I would like now for you to describe for us how you
8 went about the nonmarket valuation of visibility in the
9 second phase of this study?

10 A. In the second --

11 Q. The process?

12 A. Sure. In the second phase of the study as in the
13 first, we actually had three different versions of the
14 survey. Version A, Version B and Version C.

15 The reason we had three versions was because we didn't
16 want to burden any individual respondent with an hour-long
17 survey.

18 As a result, when individuals approached us with a
19 curiosity about what we were doing, and if they accepted our
20 invitation to take the survey, they were randomly assigned a
21 version of the survey; Version A, Version B or Version C.

22 Neither the respondent nor we the research team had any
23 knowledge of which version the visitor was going to be
24 taking at that time.

25 And in Version B, those respondents that received

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1 Version B, they received, in addition to the questions, the
2 common questions, if you will, that everyone received about
3 their visitation behavior, how long they been visiting,
4 demographic information about the respondent, those Version
5 B respondents also received a question to ask them directly
6 about their willingness to pay for improved visibility.

7 Q. And how did you design the questions that you asked
8 with respect to visibility and how was that protocol?

9 A. The short answer is, very carefully.

10 In nonmarket valuation work, there is a lot of room for
11 flexibility. That's one of its inherent benefits, actually,
12 is that you can in fact tailor a question to any good or
13 service that you value.

14 But as a result, those of us that conduct these studies
15 take great care when we construct a question and series of
16 questions about willingness to pay, that we are doing it
17 according to standard protocols.

18 In our particular case, we went with the most standard
19 protocol for a contingent valuation question.

20 Q. And what was that?

21 A. The jargon filled explanation is a dichotomous choice
22 question, which is a yes/no question.

23 There has been a great deal of research that has
24 indicated that the most reliable responses that respondents
25 can give to contingent valuation question, are those that

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1 most closely mimic a market transaction, where you can
2 either take it or leave it, or a referendum on the ballot
3 where you vote either yes or no.

4 So our question asked directly if respondents would be
5 willing to pay for improved visibility in this section of
6 the park; their responses were either yes or no.

7 Q. And how did you actually construct those questions?

8 I guess I'm asking here the next step of what the
9 questions were?

10 A. Right. There was one primary question is that yes/no
11 question. And that particular question has several key
12 elements.

13 One of them is the payment vehicle. If you're asking
14 people if they would be willing to pay something, you need
15 to provide a realistic mechanism for payment in order for it
16 to be a believable question.

17 So one of the things that we needed to determine was
18 the most appropriate payment vehicle or mode that they would
19 be paying for the improved visibility.

20 Q. What did you select?

21 A. In this particular question, we selected a payment
22 vehicle of federal income taxes.

23 Q. How does that work?

24 A. Interestingly, it did not have, in our particular case,
25 the same number of protest responses that is typical in many

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1 nonmarket valuation studies that ask about federal income
2 taxes.

3 Q. Was every person that got this question about
4 visibility in B, did they get the same question?

5 A. There were slight variations. The standard protocol,
6 again, for a nonmarket valuation study of the contingent
7 valuation of dichotomous choice type, is not to ask every
8 person the same dollar amount of willingness to pay.

9 Rather, the state of the art is to ask a range of
10 values to respondents that are randomly assigned. And in
11 our particular case, those amounts range from \$10, up to
12 \$400.

13 So some respondents received a question asking if they
14 would be willing to pay \$10 a year in additional federal
15 income taxes in order to improve visibility in this section
16 of the park. Other respondents received that same question
17 with \$400 inserted.

18 Q. Was there a range in between?

19 A. Yes. There were a total of six different bid values
20 between 10 and 400.

21 Q. And this is a standard protocol for this kind of
22 question?

23 A. Yes.

24 Q. And so how was the question phrased, just assuming one
25 particular dollar value?

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1 A. The question begins with some general background
2 information about the situation, and then directly asks
3 people, would you be willing to pay an additional \$10 in
4 federal income taxes, if you knew the money were earmarked
5 to improve visibility in the northern North Carolina section
6 of the Parkway.

7 Q. I take it, was the variation of questions then just the
8 dollar amount they were willing to pay?

9 A. Yes. Yes.

10 Q. That question -- was the amount of dollar amount was
11 assigned randomly?

12 A. Randomly by computer program. We used a computerized
13 implementation for this study. And so we didn't know which
14 dollar amounts were being assigned, just that they were
15 randomly assigned to respondents.

16 Q. And in this particular document that you have in front
17 of you, which is this results synthesis, is there a -- I
18 would like to draw your attention to page 35 of the
19 document, which is Bate stamp page number 5859.

20 I would like to draw this -- has Your Honor found that
21 page?

22 THE COURT: Yes.

23 Q. (Mr. Gulick) Dr. Mathews, do you have that page in
24 front of you?

25 A. Yes.

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1 Q. And just in general, what does this page reflect?

2 A. This page summarizes the results of the contingent
3 valuation question that we asked respondents of the Phase
4 Two Blue Ridge Parkway Scenic Experience Project on their
5 willingness to pay to improve visibility.

6 Q. Now at the top of this page, is there an explanation of
7 difference between visibility and scenic quality?

8 A. Yes. It's described as follows:

9 Scenic quality is what you see. And visibility is
10 effectively how well you can see those things.

11 Q. And did you reach a conclusion in this -- in your study
12 as to what the willingness on average of respondents was to
13 pay in additional federal taxes?

14 A. Yes. We used the results from our 240 respondents to
15 the Version B survey, and estimated those results to the
16 willingness to pay question that we just described, using
17 standard econometric procedures.

18 Using those standard procedures, we estimated an
19 average annual willingness to pay of \$328 in additional
20 federal income taxes in order to improve visibility.

21 Q. That was per respondent?

22 A. Right, per respondent.

23 Q. Did you undertake to aggregate that response with
24 respect to users of the Parkway in North Carolina?

25 A. Yes we did.

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1 Q. How did you go about doing that?

2 A. There were two main bits of data that we needed to get
3 in order to do that aggregation.

4 One was an annual amount of visitation to the North
5 Carolina section of the park.

6 We obtained that data from the Park Service itself. We
7 only used the number of recreational visits to the park,
8 because the park also of course collects other visits to the
9 park.

10 We were just limiting our aggregation to recreational
11 visitors. Because we were only sampling recreational
12 visitors during our survey.

13 In addition, that total number of visits -- annual
14 visits to the North Carolina section of the park, we knew
15 from our survey, and from previous surveys, that multiple --
16 that visitors make multiple trips per year.

17 So once we obtained the annual visitation data, we then
18 divided the number of annual recreational number of visitors
19 to the northern North Carolina section of the park, by the
20 number of annual visits that our survey respondents
21 indicated that they took per year, in order to avoid double
22 counting, that number was five.

23 Thus the number that we used for aggregation purposes,
24 in terms of the total number of annual recreational visits
25 to the northern North Carolina section of the park, was

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1 about 2.3 million per year.

2 Once we obtained that estimate, then we multiplied
3 2.3 million times the \$328 that we estimated as the annual
4 willingness to pay, to get \$760 million in annual benefits.

5 Q. That's another way to state -- that is actually stated
6 on this page?

7 A. Yes. I think it's near the bottom. Although I can't
8 tell from the cropping on it -- middle of the page,
9 apparently.

10 Yes. The last bullet under Section B indicates that --
11 that is, we assume that the sample is representative of all
12 recreational visitors to the park in North Carolina.

13 The footnote there refers to the 2.3 million annual
14 visits that we estimated. When aggregated, that yields
15 \$760 million annually in benefits of improved visibility,
16 just to these park visitors.

17 Q. Dr. Mathews, you indicated earlier that you were not
18 allowed by the Parkway to approach -- to approach visitors.
19 Did that affect the randomness of that selection process of
20 those who took the study?

21 A. To be honest, I'm not sure. It certainly affected how
22 we could approach them, because we were constrained not to.
23 However, because individuals were approaching us, we
24 actually don't have an idea of whether or not that was a
25 random approach on their part.

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1 Q. In your opinion, does that fact affect the validity of
2 this report?

3 Let me rephrase that.

4 Do you believe that the results that you got from this
5 are valid?

6 A. Oh yes. Definitely.

7 Q. Are you aware of whether or not the Blue Ridge Parkway
8 itself has put this document on its web site?

9 A. Yes. It can be found, and is frequently referenced, as
10 part of their web site. You can locate it under management,
11 and then park planning. It's with a list of other documents
12 that include research results from various studies.

13 (Plaintiff's Exhibit Number 280 was marked for
14 identification.)

15 Q. And now I would like to draw your attention to what's
16 been marked as -- like to draw your attention to Exhibit 280
17 which will come up, which is the preceding exhibit. I
18 believe you indicated that the document we were just looking
19 at was a synthesis?

20 A. Yes, that's correct.

21 Q. Now, is this the actual -- what is this document?

22 A. This is the final report for Phase Two of the Blue
23 Ridge Parkway Scenic Experience Project.

24 Q. So this -- so is the synthesis document that we were
25 just looking at, a synthesis of this Phase Two report and

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1 the Phase One report?

2 A. Yes, that's correct.

3 Q. And is the visibility study that you did within this
4 document, also discussed within this report as well?

5 A. Yes. In fact, all the results that we just discussed
6 in the synthesis report, are in this report, this Phase Two
7 report.

8 Q. In particular, I wanted to draw your attention,
9 Dr. Mathews, in this document --

10 MR. GULICK: I apologize, Your Honor. I lost my
11 tab.

12 Dr. Mathews, I would like to draw your attention
13 to page 29 of this document. Which will be the third page
14 from the end.

15 Dr. Mathews, looking at two pages of this, this
16 page that we're looking at right now and the following page,
17 I notice at the bottom of the following page, which is page
18 30 of the hard copy document, which should be shown on the
19 right on your screen, you list the figure of \$760 million
20 annually right at the very end.

21 A. Yes.

22 Q. And what I wanted to ask you about was that I had
23 noticed that on the preceding page, there appeared to be a
24 different figure in the middle of this page, the last bullet
25 area.

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1 Dr. Mathews, there appears to be a different figure
2 listed here. I was wondering if you could explain that?

3 A. Yes. The difference in the two aggregate benefit
4 amounts that you just described, the 1.8 billion annually
5 which appears on page 29, and the 760 million which appears
6 on page 30 and in the synthesis report, came about as a
7 result of different amounts of the annual visitation to the
8 northern North Carolina section of the park that I described
9 a few moments ago.

10 We were unclear as to whether or not we should just use
11 2002 visitation numbers in our aggregation. Because when we
12 talked with the park about this number, they indicated that
13 visitation in that year alone, 2002, was actually higher
14 than it had been in the few previous years.

15 And so in order to avoid inflating, if you will, the
16 aggregation to reflect just the number of visits from that
17 one year, what we decided to do, in a second version of
18 this, which ultimately lead to the 760 million amount, was
19 to use 10-year average of visitation to that section of the
20 park.

21 That 10-year average was actually lower than the
22 visitation than was reported by the Park Service in 2002.
23 And as a result, our aggregation was diminished,
24 significantly.

25 Q. And you chose the 700 -- what was the reason you chose

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1 the lower figure?

2 A. Well, we wanted to be conservative in our aggregation.

3 Q. And so what was the -- was there a reason that the
4 higher figure was included on page 29?

5 A. That was a proofreading error. As I mentioned a bit
6 ago, in the first version we were using the 2002 numbers.
7 When we went back and redid those numbers to be more
8 conservative, we merely missed changing that dollar amount
9 on page 29.

10 Q. So the figure of \$760 million figure is your --
11 actually your conclusion figure?

12 A. Yes. That is our conclusion figure in terms of the
13 aggregate benefits for improving visibility.

14 MR. GULICK: Thank you.

15 I have no further questions, Your Honor.

16 But I would move the admission into evidence of
17 Exhibits 439, 281 and 280.

18 THE COURT: All right. Let those be admitted.
19 (Plaintiff's Exhibit Number 280, 281, 439 having been
20 marked, was received in evidence.)

21 MR. GULICK: I have no further questions at this
22 time, Your Honor.

23 CROSS-EXAMINATION BY MS. GILLEN:

24 Q. Good afternoon, Dr. Mathews. Your research was
25 designed to estimate the nonmarket values that visitors have

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1 to the Blue Ridge Parkway, correct?

2 A. Yes.

3 Q. And it was not designed to estimate the economic
4 impacts of their visits to the Parkway?

5 A. That is correct. Although we did in both Phase One and
6 Phase Two, ask about expenditures so that we could generate
7 some of those numbers.

8 Q. And the calculation of economic impact was a rough
9 estimate?

10 A. Yes. And it relied on reported expenditures that
11 respondents gave on the survey.

12 Q. And I think you testified that you used contingent
13 behavior and contingent valuation approaches for your
14 survey?

15 A. That's right. The contingent valuation was used to
16 estimate the value of preserving scenic quality, and to
17 estimate the value of improving visibility.

18 The contingent behavior was used to estimate the
19 changes in the number of visits that people said they would
20 take, if scenic quality declined.

21 Q. And they're called contingent valuation, because they
22 ask people how they would act if they were placed in certain
23 possible situations?

24 A. That is correct.

25 Q. And the stated preference model, contingent valuation,

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1 does not use actual observed market behavior as the basis of
2 benefit measure?

3 A. That is correct. It relies exclusively on stated
4 preferences.

5 Q. And they're somewhat controversial because it relies on
6 a person's stated contentions, in contrast to actual
7 observed behavior; is that correct?

8 A. Could you repeat that first part?

9 Q. These approaches are somewhat controversial, because
10 they rely on a person's stated intention, in contrast to the
11 actual observed behavior used in hedonic models?

12 A. And hedonic in addition to other revealed preference.
13 I would say that that depends on the model, quite frankly.
14 That is, to get at the question of the controversy, I think
15 it depends on the model.

16 Q. That is stated in the report?

17 A. Yes.

18 Q. That controversy was stated in the report?

19 A. Of course.

20 Q. And the focus of this study overall was really not on
21 visibility or the interrelationship between scenic quality
22 and visibility, was it?

23 A. That's correct.

24 Q. It was just one survey question about visibility that
25 you added for the North Carolina section of the study, this

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1 Phase Two?

2 A. That's right. And as I testified to earlier, this came
3 about because of responses to the first phase of the study
4 where respondents did indicate a concern about visibility.

5 Q. And in all of Phase Two, you received 640 usable
6 responses?

7 A. That's correct.

8 Q. And the visibility question was posed to only 240
9 respondents, a subset of those 640?

10 A. I think it was posed to more than that, but we were
11 only able to obtain complete usable responses from 240.

12 Q. And your estimate of the respondent's willingness to
13 pay for improved visibility, is a result of various
14 assumptions, is it not?

15 A. Yes.

16 Q. It estimates the number of recreational visits to the
17 Blue Ridge Parkway at 11.62 million each year?

18 A. That 11.62 is the 10-year average from 1993 to 2002 of
19 the recreational visits to the northern North Carolina
20 section of the park, as reported by the Park Service.

21 Q. And actually I think you testified that they said the
22 2002 numbers were much higher than the previous numbers?

23 A. And higher than the average, actually. The 2002 was
24 over 12 million a year. So that was why we used the
25 average.

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1 Q. So that would suggest actually that visitation to the
2 Blue Ridge Parkway is going up, was it not?

3 A. It was at that time. The trend since then, I'm not
4 clear about. I haven't looked at that data.

5 Q. And your estimate of the respondent's willingness to
6 pay for improved visibility, also assumes that each visitor
7 makes five trips to the Blue Ridge Parkway each year to
8 arrive at 2.3 million?

9 A. That was not assumed by us. That was reported to us by
10 the respondents when we asked them how many trips they took
11 a year.

12 Q. You applied that over the whole subset?

13 A. Yes.

14 Q. And this assumes though, that this sample of 240
15 respondents is representative of the estimated 2.3 million
16 visitors to the Blue Ridge Parkway each year?

17 A. That's right.

18 Q. And the result of your question about visibility was
19 that these 240 respondents who were asked the question about
20 visibility, indicated that they would be willing to pay over
21 \$300 in additional federal income taxes annually, in order
22 to improve visibility in the northern North Carolina section
23 of the Blue Ridge Parkway; is that right?

24 A. Yes.

25 Q. And the analysis of that result though, appears in your

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1 report states, "while this may seem like a significant
2 amount of money, when expressed as a fraction of these
3 respondents annual income, it is a very small percentage,
4 0.5 percent of less than 1 percent"; is that right?

5 A. I think, or less than 1 percent, .5 percent of their
6 income, yes.

7 Q. I put a zero before the point. So point 5 percent --
8 and the overall result of the whole study showed that only a
9 fraction of the respondents, maybe between one fifth and one
10 quarter, indicated that they would change their visitation,
11 because of a change in scenic quality; is that right?

12 A. That number varied depending on which change we were
13 looking at.

14 In some scenarios we found significantly greater
15 percentages of visitation change. But it varied depending
16 on how dramatic the improvements or degradation to scenic
17 quality were.

18 Q. But the range was somewhere between 20 percent and
19 25 percent?

20 A. Actually some of the significant degradations were
21 greater than that, in terms of if they would change their
22 visitation at all.

23 I think the percentage you were referring to is the
24 percentage of visitors that indicated they would stop coming
25 completely.

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1 Q. You also tried to quantify the value of the scenic
2 quality preservation?

3 A. Yes.

4 Q. And overall you found that respondents were very
5 satisfied with the Blue Ridge Parkway.

6 In particular, respondents assigned their greatest
7 satisfaction with the number overlooks and the scenic
8 quality and roadside areas?

9 A. Yes, that's correct.

10 MS. GILLEN: Thank you, Dr. Mathews. No further
11 questions.

12 MR. GULICK: Very briefly, Your Honor.

13 REDIRECT EXAMINATION BY MR. GULICK:

14 Q. Dr. Mathews, scenic quality and visibility are
15 different, are they not?

16 A. That's right.

17 MR. GULICK: I have no further questions.

18 THE COURT: All right. That will complete your
19 testimony then, and you may be excused Dr. Mathews. Thank
20 you.

21 MR. GULICK: Thank you, Your Honor.

22 We have one more witness, but I know it's going to
23 take more than five minutes, Your Honor. He's very
24 gracious, I believe he would be willing to come back on
25 Monday morning.

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1 THE COURT: This having been a full week, I think
2 we will quit until Monday morning at 9:00.

3 (Court was in recess at 5:56 p.m. until Monday morning at
4 9:00.)

5 * * * * *

6 UNITED STATES DISTRICT COURT

7 WESTERN DISTRICT OF NORTH CAROLINA

8 CERTIFICATE OF REPORTER

9
10
11 I, Laura Andersen, Official Court Reporter,
12 certify that the foregoing transcript is a true and correct
13 transcript of the proceedings taken and transcribed by me.

14
15 Dated this the 20th day of July, 2008.

16
17
18 s/Laura Andersen
19 Laura Andersen, RMR
20 Official Court Reporter
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